

IN THE
Supreme Court of the United States

OCTOBER TERM, 1944.

No. 50

THE DOW CHEMICAL COMPANY, a corporation,
Petitioner,

vs.

HALLIBURTON OIL WELL CEMENTING COMPANY, a corporation,

Respondent.

No. 61

HALLIBURTON OIL WELL CEMENTING COMPANY, a corporation,

Cross-Petitioner,

vs.

THE DOW CHEMICAL COMPANY, a corporation,
Cross-Respondent.

BRIEF ON BEHALF OF HALLIBURTON OIL
WELL CEMENTING COMPANY.

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Statement of the Case.

The Dow Chemical Company filed this suit in the District Court for the Eastern District of Michigan alleging ownership of the Grebe & Sanford patent and infringement thereof by Halliburton Oil Well Cementing Company defendant.* From a decree dismissing the suit [R. 1492] plaintiff appealed to the Court of Appeals for the Sixth Circuit, which court affirmed the appealed decree [R. 2051]. Both the District Court and the Court of Appeals found the Grebe & Sanford patent invalid, but, if valid, infringed.

Prior to the commencement of this suit plaintiff filed a suit in the United States District Court for the Northern District of Oklahoma against Williams Bros. Well-Treating Corporation for infringement of this Grebe & Sanford patent. The District Court adjudged the patent invalid. Upon plaintiff's appeal the Circuit Court of Appeals for the Tenth Circuit reversed such judgment, holding the patent valid and infringed. (*Dow Chemical Company v. Williams Bros. Well-Treating Corporation*, 81 F. 2d, 495.)

The Tenth Circuit Court held that Grebe & Sanford "conceived the idea of dissolving the formation in which nature stored its oil." (*Dow Co. v. Williams Bros. Co.*, 81 F. 2d, 11, 12-14, p. 500.) It stated in effect that "this process increased the ultimate recovery from the sand, and that the production of more oil in a more efficient way is accomplished by the patent in suit." [*Cf. Opinion 6th Cir.*, R. 2058; 139 F. 2d, 477.]

The opinion of the Sixth Circuit Court contrasts the rationale of the divergent opinions. It points out that

*To avoid confusion the parties will be referred to herein as "Plaintiff" and "Defendant" respectively.

"the increase in the flow of the well is not the problem claimed to be solved by the alleged invention, * * *" [R. 2058]; that the Grebe & Sanford patent recognizes that subjecting the oil-producing formation to hydrochloric acid under pressure to open up the pores and channels of the formation, permitting a freer flow of oil, was public knowledge prior to Grebe & Sanford's alleged invention; that such process is fully disclosed in the Frasch Patent No. 556,669 of 1896 [R. 1935]; that the object of Grebe & Sanford's purported invention "is simply to protect the equipment from the hydrochloric acid" and that "The single question is whether the conception of adding a corrosion inhibitor to hydrochloric acid for use in acidizing wells in order to reduce corrosion requires anything more than ordinary skill of the calling or involves any patentable invention." [R. 2058; 139 F. 2d, 477]; it referred to the testimony of plaintiff's expert Bartell, who in response to inquiry by the District Court as to what Grebe & Sanford claimed over the Frasch Patent disclosure, stated that so far as increasing the flow of the well, Grebe & Sanford did not claim to have accomplished anything; that they claimed no new result except protection of the well equipment; that the addition of the inhibitor has no effect on the reaction of the acid upon the limestone [R. 323-324]. It concluded "It was old to increase production by the use of hydrochloric acid under pressure. * * * It was old to use inhibitors with hydrochloric acid * * * to reduce corrosion * * *" The only novel element here was that appellant first charged the inhibited hydrochloric acid into the limestone formation through the pump tube. The application of these two old principles to an oil well and the obvious step of conducting the acid through the pump tubing did not constitute invention, in view of the

prior art as presented in this case. All that was required was expected mechanical skill. No new result was achieved." [R. 2059; 139 F. 2d, 477.]

Plaintiff in its brief herein practically abandons all claim that patentable novelty or patentable invention is to be found in Grebe & Sanford's addition of a corrosion inhibitor to the acid. Plaintiff now predicates its claim of patentable novelty and invention upon the use of a more dilute hydrochloric acid, asserted by plaintiff to be more efficient in degree in dissolving limestone formation of an oil well. This, plaintiff now urges, is the very essence of the Grebe & Sanford patent disclosure. "The inhibitor prevents the acid from attacking and damaging such metal equipment of the well as the pump tubing, well casing, etc., but does not affect the action of the acid on the limestone." (Dow Br. p. 4.) "Inhibited acid presumably attacks limestone the same as does raw acid and we have always conceded this. Therefore, the difference in results must lie largely or wholly in the relative concentration of the acid and the manner of its introduction." (*id.* p. 41.) The Tenth Circuit Court's Opinion does not turn upon such distinction. On the contrary, no reference whatsoever thereto is to be found in such Opinion. The opinion is predicated upon some mysterious unexplained difference. "The inhibiting reagent alone could not dissolve the limestone; the acid without the inhibitor had proven to be a failure. Only through the co-action of the two was the result accomplished in a practical way." (81 F. 2d 499.) Nor is there any reference whatsoever in the Grebe & Sanford patent or anything even inferentially suggesting that increase in production of oil is dependent upon or is effected by the degree of dilution of the acid. Nor was any such contention made in the

Sixth Circuit Court; no reference thereto is found in the Sixth Circuit Court's Opinion. The record herein contains no testimony on the subject. Nothing in the record sustains this new theory so advanced for the first time in this Court.

To support its claim that the inventive feature of the patent is the use of a more dilute hydrochloric acid, plaintiff's brief herein speculatively advances the following theories:

(1) "Concentrated acid is more viscous than dilute acid and reacts more violently with limestone. Consequently, it enters the small rock pores more slowly and expends itself on the walls of the well hole and the rock closely adjacent thereto." (Br. p. 14.)

(2) That "The resulting spent acid solution is a viscous concentrated calcium chloride brine which must be forced out into the formation ahead of the incoming acid before fresh acid can enter and enlarge the pores. There the spent acid hinders the flow of oil to the well following the treatment." (Br. pp. 14 and 15.)

(3) That "The high concentration of the acid used by Frasch was no doubt responsible for an even more serious defect in that process—viz., the failure to produce increases in production sufficient to justify the expense of the treatments." (Br. p. 33.)

(4) That in the actual treatment in an oil well "concentrated acid forms and takes up calcium chloride with much greater rapidity than does dilute acid and the higher the percentage of calcium chloride in the spent acid the more viscous it becomes." (Br. p. 34.)

(5) That "this spent acid would have to be forced back into the formation ahead of the incoming fresh acid be-

fore the latter could reach and attack the pores in the formation away from the well hole." (Br. p. 34.)

(6) That "Another possible explanation of the unsatisfactory increases that resulted from the Frasch treatments was the difficulty of removing this viscous spent acid from the pores of the rock. It had to be forced out ahead of the oil by the natural rock pressure and to the extent that this spent acid remained in the pores the flow of oil to the well hole was blocked or lessened." (Br. p. 34.)

(7) That "although Frasch's concentrated acid reacted much faster with the rock and so should have been forced in much faster to prevent its spending most of its strength enlarging the well hole and the pores close to the hole, inherently it went in much more slowly under comparable conditions." (Br. p. 37, cf. 39.)

This Court is now asked to ignore the fact that the Grebe & Sanford patent was granted for adding a corrosion reducing agent to the acid and to decide the validity of the patent upon speculations and theories asserted in plaintiff's brief. Such mere speculations and assertions of differences in the effect of dilute acid over a more concentrated acid in dissolving limestone formations, cannot supply the failure of proof. No such speculations were advanced as issues of fact by plaintiff upon the trial. Plaintiff offered no testimony in support thereof. No finding of fact by the District Court or by the Court of Appeals in this case bears even remotely upon these new speculations and theories advanced by plaintiff in its brief. Nor were any such factual speculations and theories referred to by the District Court or Court of Appeals in the *Williams Bros.* case.

Summary of Argument.

1. THE GREBE & SANFORD PATENT.

What is the alleged invention as set forth in this patent? It is the use of a corrosion inhibiting agent in the hydrochloric acid to minimize attack of the acid upon the metal equipment of the well. Nothing in the patent indicates an assertion that the acid acts in dissolving limestone well formation in any different manner or degree or produces any different result than in the admittedly old Frasch patent method.

2. PLAINTIFF'S NOVEL SPECULATIVE THEORIES.

There is nothing in the Grebe & Sanford patent to support the speculations of plaintiff's brief and the arguments founded thereon with respect to any difference in operation of the acid whether a commercial hydrochloric acid (30% HCl, 70% water) or a 5 to 20% acid is used. Plaintiff's speculative theory regarding the viscosity of the acid has no foundation in the record or in fact.

3. INTRODUCTION OF THE ACID INTO THE WELL THROUGH THE ORDINARY PUMP TUBE ALREADY IN THE WELL.

There was nothing inventive in this. Inclusion of the use of the pump tube in claims 8 and 9 was necessary to set forth some utility for the inhibiting agent in the acid.

4. FORCING THE ACID INTO THE ROCK BY PUMP PRESSURE.

This was not novel. It is completely disclosed in the Frasch patent and in the Oil City Derrick publication.

5. THE USE OF HYDROCHLORIC ACID TO DISSOLVE LIMESTONE FORMATION IN AN OIL WELL TO FACILITATE THE OIL FLOW.

Both the Frasch patent and the Oil City Derrick publication [PX 142, R. 1656], published October 10, 1895, made part of the public knowledge such use of hydrochloric acid.

6. THE FRASCH USE WAS SUCCESSFUL.

The increases in production were fully comparable to the increases in production achieved by defendant in treating the three wells charged to infringe herein.

The Frasch patent 556,669 [R. 1935] disclosed "The method of increasing the flow of oil-wells in limestone formations, by introducing into the well a large quantity of a chemical reagent which is a solvent of the rock (such as hydrochloric or muriatic acid), and subjecting such reagent to strong pressure." [Claim 4 - R. 1937.]

7. THE FRASCH PATENT AND THE OIL CITY DERRICK PUBLICATION.

Under the patent statute R.S. 4886, 35 U.S.C.A., Sec. 31, all disclosed therein became part of the public knowledge. The statute prohibits the later grant of a patent thereon. From the fact that this patent and publication were in fact unknown to American oil producers and petroleum scientists "nothing can be deduced favorable to the (Grebe and Sanford) patent". *Bone v. Commissioners of Marion County*, 251 U. S. 134, 144. Cf. *W. H. Butcher Packing Co. v. Cincinnati B. S. Co.*, 35 F. 2d 567, 569.

8. THE ADDITION OF A CORROSION REDUCING AGENT TO THE ACID PRODUCED NO NEW RESULT: IT DID NOT CHANGE THE EFFECT OR MANNER OF DISSOLVING THE LIMESTONE FORMATION: IT MERELY SUBSTITUTED ONE KNOWN MEANS FOR REDUCING CORROSION OF THE METAL EQUIPMENT OF THE WELL FOR ANOTHER KNOWN MEANS. THIS WAS NOT A NEW PROCESS. NO INVENTION WAS INVOLVED.

It is an admitted fact in this case that the so-called inhibiting agent has only its old purpose and effect, of reducing the corrosiveness of the acid incident to its contact with the metal parts; that it has no effect upon the action of the acid in dissolving the limestone in the well formations. No new function is evolved from this combination; the results achieved are only those old separate results which follow from the separate well-known operations of each of these respective elements.

9. HYDROCHLORIC ACID CONTAINING "1 TO 5 PER CENT OF AN ARSENIC COMPOUND" WAS A PART OF THE PUBLIC KNOWLEDGE PRIOR TO GREBE & SANFORD'S CLAIMED INVENTION. ITS USE TO REDUCE CORROSION IN TRANSPORTING ACID TO ITS PLACE OF USE WAS ALSO PUBLIC KNOWLEDGE.

The Gravell patent 1,678,775, granted July 31, 1928 [R. 1947] added to the fund of public knowledge the addition to hydrochloric acid of an arsenic trioxide (As_2O_3) [R. 1948, ll. 1-5] for the purpose of preventing the acid attacking the steel drums or containers in which it is stored or by which it is transported. To use Gravell's inhibited acid for the purpose of conducting it to an oil well and thence down through the casing or pump

tube of the well, thus utilizing the inhibition to protect the metal parts of the well was not inventive. It was a use for which such inhibited acid was available. It was the mere substitution of one method and means of protecting the well equipment from corrosion for another method and means employed by Frasch. The limitation of effect of corrosion inhibition of the acid was as to its effect upon the well equipment, and without respect to the reaction of the hydrochloric acid in dissolving limestone. The Sixth Circuit Court of Appeals was correct in stating that "The application of these two old principles to an oil well and the obvious step of conducting the acid through the pump tubing did not constitute invention, * * *. All that was required was expected mechanical skill. No new result was achieved." [R.2059.]

10. THE GYPSY OIL COMPANY USE.

The facts in connection with this use particularly illuminate the actual knowledge possessed by scientists in 1928. Gypsy Oil Company's problem was the formation of limestone scale on the casing, tubing, etc. of the well and upon the face of the sand in its well. It used inhibited acid which dissolved and removed this scale. It secured its knowledge of such inhibited acid from the Mellon Institute at Pittsburgh. While a single public use invalidates a patent, *Electric Storage Battery Co. v. Shimadzu*, 307 U.S. 5, 20, the record establishes successful use of inhibited acid upon other wells by the Gypsy Oil Company.

This use by Gypsy Oil Company was not abandoned. The reason Gypsy Oil Company called plaintiff to treat a well in 1933 was because the well was located in Kansas remote from the place where Gypsy was operating. [R. 1089.]

11. THE USE OF THIS VERY PROCESS WAS SUGGESTED TO GREBE & SANFORD BY THE PURE OIL COMPANY AND WAS NOT ORIGINAL WITH THEM.

The Pure Oil Company suggested to plaintiff and its alleged inventors, the use of hydrochloric acid to increase oil well production by dissolving limestone formation. It was the Pure Oil Company that took up such method in 1932. It was supposed by both Pure Oil Company and plaintiff to be a discovery. Neither had any knowledge of the Frasch patent or Oil City Derrick publication.

The Pure Oil Company asserted the rights to a patent upon such process. The dispute between Pure Oil Company and plaintiff was settled by a contract between the parties in which Pure Oil was granted "without royalty charge a non-exclusive license under Patent 1,877,504 and under any other patents which Dow may acquire, own or control relating to acid treatment of oil or gas wells." [R. 1874.]

12. OIL MAKERS COMPANY.

Dougherty, Markey, Lee and Sprenger in June, 1932, formed a company to go into the business of acidizing wells for others [R. 1195]. In October, 1932, they organized as Oil Makers Company [R. 1256]. They began acidizing wells in June, 1932, and continued in business for about a year. They used raw commercial acid purchased from Penn Salt Co. [R. 1166, 1193, 1196, 1197, 1199]. In September, 1932, they purchased some acid from Grasselli Chemical Company containing "Duclean No. 2," a pickling compound [R. 1174-6; 1178-80; 1193, 1199-1201, 1236] and operations were successful with both raw commercial hydrochloric acid and with the in-

hibited acid. Oil Makers went out of business because they did not have sufficient capital and because their customers were afraid of suit by plaintiff.

13. THE WILLIAMS BROS. DECISION. ITS ERRONEOUS ASSUMPTION OF FACTS, AND A COMPARISON THEREOF WITH THE FACTS ESTABLISHED BY THE RECORD HEREIN.

In its opinion the Sixth Circuit Court of Appeals points out that the evidence contained in the record in the instant case compels a different conclusion from that arrived at in the *Williams Bros.* case opinion (139 F. 2d 475). Under this heading defendant will consider the errors of fact and of inference upon which the conclusion of the Tenth Circuit Court of Appeals is based and point out that each of these inferences and errors of fact is disproven by the record in the instant case.

14. THE DOCTRINE OF LONG FELT WANT IS NOT APPLICABLE TO THIS CASE.

Like immediate public adoption and use as a factor to be considered in a case where invention is in doubt, the long-felt want doctrine applies only in cases of such doubt.

The hiatus in plaintiff's argument is that there is a total lack of evidence that any oil producer or scientist engaged in the oil well production art actually had any knowledge of the Frasch patent, the Oil City Derrick publication, or the patents disclosing the use of an agent which added to hydrochloric acid would control, inhibit or minimize the corrosive action of the acid upon metal parts. In the absence of such proof the doctrine does not apply. *Toledo Pressed Steel Co. v. Standard Parts*, 307 U. S. 350, at 356.

15. DEFENDANT ADDED NO INHIBITING SUBSTANCE TO ITS ACID. ITS METHOD DISSOLVED IRON, STEEL, LEAD AND COPPER FORMING IN THE ACID THE DISCLAIMED METAL CHLORIDES.
16. THE PATENT DOES NOT DISCLOSE THAT A METALLIC CHLORIDE MAY BE USED AS AN INHIBITOR.
17. THE GREBE & SANFORD PATENT SETS FORTH THE ALLEGED INVENTION AS CONSISTING IN THE ADDITION TO THE HYDROCHLORIC ACID OF A SUBSTANCE WHICH PREVENTS THE DISSOLVING ACTION ("ATTACK") OF THE ACID UPON METALS, "IRON OR STEEL, COPPER, ETC."). [R. 1501, II. 76-77.]
18. THE ADJUDICATION OF INFRINGEMENT IS FOUNDED UPON THE "MINUTE QUANTITIES OF COPPER, IRON AND LEAD CHLORIDES (WHICH) ARE DEPOSITED ON THE INSIDE OF THE STEEL CONTAINER, FORMING A PROTECTIVE COATING." [CCA6 Opinion, R. 2054.]
19. PLAINTIFF DISCLAIMED METALLIC CHLORIDES AS THE EQUIVALENT OF THE CORROSION INHIBITING SUBSTANCES SPECIFIED IN THE PATENT.
20. THE INFINITESIMAL AMOUNT OF COPPER CHLORIDE DOES NOT FALL WITHIN ANY RANGE OF INHIBITING SUBSTANCE SPECIFIED IN THE GREBE & SANFORD PATENT.

BRIEF FOR RESPONDENT ON THE QUESTION OF VALIDITY.

The Grebe & Sanford Patent [R. 1501].

What is the alleged invention as set forth in this patent?

It refers [p. 1, ll. 43-57] to the method described in the Frasch patent 556,669 [R. 1935] and states: "The acid has the effect of attacking and dissolving the rock, thereby enlarging the cavity at the bottom of the well, or the channels and pores in the rock through which oil flows to the well."

Nowhere in this patent is there any assertion that Frasch's hydrochloric acid was not or is not efficient for this purpose. Nothing is said about any difference in kind or degree of dissolving of the rock or enlarging the channels or pores dependent upon the degree of dilution of the acid. The patent states:-

"In actual practice, however, this method has never been generally adopted, due to the fact that the acid attacks the metallic casing, pump tube, etc. about as actively as the rock, and causes serious damage thereto." (ll. 52-57.)

It then states the alleged discovery:

"We have now found that the last-mentioned method may be adapted for use in increasing or restoring the flow of oil wells by suitable modification without material injury to the casing or other metallic parts of the well. * * *

"In carrying out our improved method we employ a mineral acid, preferably hydrochloric acid, inasmuch as the latter upon reacting with the calcareous rock forms water-soluble salts which remain in solution and are removed from the well with the spent

acid. To the acid we add a small amount of a substance capable of inhibiting attack of the acid upon metal surfaces, e. g. of iron or steel, copper, etc., with which it comes in contact." (ll. 58-78.)

Substances capable of inhibiting attack of the acid upon metal surfaces are then listed.

According to the import of the patent, the object of the invention is to avoid the injury to the metallic equipment of the well by avoiding corrosion of the metal by the acid. The improvement is the substitution of inhibition of the acid for the mechanical means disclosed in the Frasch patent for avoiding such injury.

The Sixth Circuit Court found that: "the patent itself recognizes the fact that this idea was conceived by Frasch, and that increase in production was obtained by the Frasch method; and in the instant case appellant's expert stated that the inhibitors 'would have no effect on the acid in connection with its reaction upon limestone,' and that the result 'would be limited apparently to the equipment, rather than to the well itself.' Hence under appellant's own testimony the increase in the flow of the well is not the problem claimed to be solved, for since the addition of the corrosion inhibitor to the hydrochloric acid does not affect the action of the acid upon the limestone, no new process is created." [R. 2058].

The District Court questioned plaintiff's expert, Dr. Bartell, respecting the Frasch patent and the Grebe & Sanford patent.—

"The Court: Well, now, what new do they claim? What improvement do they claim they made over that? How do they claim they change?

"A. My understanding is that the main claim for improvement is the addition to the hydrochloric acid of some material which will inhibit the action of the acid.

"The Court: There is no claim that the acid, for instance, in this well, would not have done just as good a job as if it had not gone into it—

"A. I do not believe so.

"The Court: They do not claim any new useful result. They just claim to have avoided a misfortune.

"A. The useful result would be limited apparently to the equipment, rather than to the well itself.

"The Court: As far as increasing the flow of the well, and all of that, they do not claim to have accomplished anything?

"A. I don't think so.

"The Court: But simply to have avoided a misfortune?

"A. I think so. Inhibitors, such as are suggested here, as far as I know, would have no effect on the acid, in connection with its reaction upon limestone.

"The Court: All right. In other words, it has absolutely,—the adding of this has no effect that we know anything about or claim anything about on the work which is desired to be done in treating the well?

"A. That is my understanding. But it does have a specific function on the metal equipment used in connection with the well treatment." [R. 323-4.]

No such admission was made by plaintiff in the *Williams Bros.* case.

The only reference in the Grebe & Sanford patent to the strength of the aqueous hydrochloric acid solution is

in connection with its corrosive action upon the metal of the well equipment.

"The strength of the aqueous hydrochloric acid solution, in general best adapted to the purpose in hand, may be between about 5 per cent and about 20 per cent, and preferably should be between 10 and 15 per cent although other concentrations may be used, if desired. *With such strength of acid the corrosive action thereof upon metals, particularly iron or steel, can be largely or substantially inhibited by adding thereto a relatively small amount of an arsenic compound or other inhibiting agent. Consequently, the acid can be introduced into the well through the pump tube, so that the latter need not be withdrawn prior to the treatment.* It is sufficient merely to pull the pump rod and valves, and to pour the acid solution into the well through the tube. Due to the presence of the inhibitor there will be no substantial attack upon the pump tube, or upon the well casing if the charge of acid rises high enough in the well to contact with the casing." [R. 1502, lines 7-29]*

It is clear that this text contains no reference whatsoever to any difference (either in manner or kind or even in degree) in the operative effect between stronger and weaker acid in dissolving the limestone formation. The patent makes no reference whatsoever to any difference in the manner or even in the degree of dissolving the limestone formation, which difference is in any manner asserted to be dependent upon the use of stronger or weaker acid.

*Throughout this Brief emphasis supplied by us, unless otherwise indicated.

The thesis of the patent is the use in the acid of an inhibiting agent to control the corrosive action of the hydrochloric acid upon the metal parts of the well equipment. By expert testimony, [R. 1365, 1368 and Exhibit 343, R. 1802] plaintiff attempted to develop the difference in degree of corrosive action upon steel between relatively stronger and weaker hydrochloric acids. This testimony stresses the fact that with more dilute acid the corrosion rate was less than with stronger acid. This testimony was obviously produced by plaintiff to support the thesis of the patent, *i. e.*,— that the object of the invention was to protect the well equipment from injury.

Nor did the plaintiff assert to the Patent Office that the function of the acid in dissolving limestone differed either in manner or kind or in degree dependent upon the strength (dilution) of the acid. In plaintiff's petition to The Commissioner of Patents for special immediate consideration of the Grebe & Sanford application, it represented that "The feature of the method consists in the use of a prepared acid *which does not attack and corrode metallic pipes, valves, pumps and other parts of well equipment.*" [R. 2021.] Following a rejection of the application, plaintiff filed an argument giving its reasons why the patent should be allowed. This argument was in great detail. It covers over ten printed pages of the record herein [R. 2027 to 2038]. In this argument plaintiff did not contend that the strength of the acid was in any manner critical so far as its action in dissolving the limestone or well formation was concerned. No reference was made to dilute acid. Not a word was said in this argument that the success of the method in dissolving the limestone formation depends upon dilution of

the acid. *Invention was urged as existent in the inhibition of the acid against corrosion of the metallic equipment of the well.*

The Record Conclusively Establishes and the Sixth Circuit Court Found That

"It was old to increase production by the use of hydrochloric acid under pressure." [R. 2059].

The Frasch patent and the Oil City Derrick October 10, 1895 publication [R. 1651] made a part of the public knowledge the fact that the introduction of hydrochloric acid under pressure into the cavity of an oil well would dissolve the limestone formation, increase its porosity, and open channels in it to permit the oil to flow into the well cavity.

The record establishes that in 1895 and 1896, Herman Frasch and John W. Van Dyke successfully, publicly and commercially treated limestone formations of oil wells near Lima, Ohio, and increased the production thereof, by pumping dilute commercial grade hydrochloric acid into the well formations [PX¹ 93 - R. 1651; PX 144 - R. 1657; PX 145 - R. 1658; PX 146 - R. 1659; PX 148 - R. 1661; see also the testimony of Nichols, an eye witness, R. 1030 *et seq.*; Irish, R. 1040; Neubauer, R. 1057; *Cf.* F. F. 71 - R. 1488-9]. The pipe used to conduct the acid down the well was coated [R. 1044] to protect it from the corrosive action of the acid. PX 93 is a reproduction of an article published Oct. 10, 1895 in the

¹The exhibits of the respective parties were marked consecutively, those of the plaintiff being identified as "PX"; those of the defendant, as "DX".

"OIL CITY DERRICK," which PX 142 [R. 1656] states is "The most valuable existing record of development of the petroleum industry in the United States. Special attention to markets, field operations, and production." Its publication began Jan. 14, 1876.² Under the provisions of R.S. 4886 (35 *USCA*, Sec. 21) this printed publication made, as of Oct. 10, 1895, the process or method of treating limestone formations of oil wells with hydrochloric acid a part of the public knowledge. The method as published in this article differs from the disclosure of the Grebe & Sanford patent only in that the described operation consisted in using one-inch tubing to conduct the acid below the casing of the well, the one-inch tubing being coated so that the acid would not affect it [R. 1044, 1049, 1050, 1884, 1890], while the Grebe & Sanford operation consists in using hydrochloric acid solution into which has been introduced an inhibiting substance. The purpose and result of using such coated tubing, or its substitute (an inhibiting substance added to hydrochloric acid), is the same, to wit: to protect the tubing or pipe through which the acid is introduced into the well cavity below the casing, where the limestone formation is to be subjected to the action of the hydrochloric acid. This article states that: —

"Two months ago, a practical test of this process was made on a well on the Crossley farm, owned by the Ohio Oil Company, near Lima, Ohio. There were 65 barrels of acid used in the well on the Crossley farm. The channels in the oil rock in this

²Plaintiff's counsel, Mr. Owen, stated: "The Oil City Derrick, I understand, was the leading publication in the oil industry way back at that early date." [R. 1194A].

well, were so tight that even with a pressure of between eight and nine hundred pounds per square inch, the rock would take barely a barrel of acid and water per hour.* However, as the acid began to perform its work, the channels in the rock were gradually increased so that at the finish the rock would readily take up six barrels per hour.

"Since doctored, this well has been pumped some 40 days. The oil was increased 300 per cent, and the gas over 400 per cent. The increase has been permanent as the well is holding up." [R. 1653-4.]

The record contains no testimony produced by plaintiff contradicting any of the facts respecting Frasch & Van Dyke's successful public commercial use of such process. Anyone, having before him the "Oil City Derrick" article of Oct. 10, 1895, would be taught thereby that by treating an oil well with hydrochloric acid to dissolve or eat the limestone formation the well's production would be increased.

Frasch's Method Was Successful in Its Use.

There was no evidence whatsoever before the Court in the *Williams Bros.* case respecting any use or attempted use by Frasch. The record herein is replete with such evidence. The District Court found as a fact that the method disclosed in the Frasch patent "was success-

*Since, in the initial part of the treatment the rock took "barely a barrel of acid and water per hour," it is apparent that the acid was not used full strength. Contrary to the assertion, (Dow brief, p. 43) that since Frasch's time nobody has ever tried to use concentrated acid, Sprenger used such acid in 1932 and got good results [R. 1257, 1258].

fully used on a commercial basis in the acidizing of a number of wells near Lima, Ohio, in 1895." [F. F. 71 - R. 1489]. The Sixth Circuit Court of Appeals affirmed this finding and amongst other things said of Frasch: "His essential conception was to attack the limestone rock with a chemical reagent which would disintegrate the rock, increase its porosity, and open the channels into the pay. In this he fully succeeded." [R. 2055-6].

Plaintiff asserts that the work done by Frasch was not a commercial success. The record proves otherwise. It is shown by oral testimony [R. 1032, 1035, 1042, 1044, 1045, 1060], and by records [R. 1884-1907; DX 72-138] that a number of wells were treated and the production materially increased. The record contains references to the following wells so treated by Frasch and Van Dyke:

Well	Result of Acidizing	
	Production Before	Production After
Crossley #3 [R. 1894]	1.6 bbl/day [R. 1894]	Increase 300% [R. 1654]
Arnot [R. 1891]	11 bbl/day	16 bbl/day [R. 1658]
Neely #1 [R. 1890]	7 bbl/day	17 bbl/day [R. 1660]
Mary Richards #1 [R. 1895]	3 bbl/day	12 bbl/day [R. 1660]
Taylor [R. 1897]	8 bbl/day	35 bbl/day [R. 1657]
Cusac #2 [R. 1897]	-4 bbl/day	4 bbl/day [R. 1658]
Presser #4	7-1/2 bbl/day	20 bbl/day [R. 1660]
Metz #1	2-1/2 bbl/day	11 bbl/day [R. 1658]
Hydecker #1	3 1/2 bbl/day	6 bbl/day [R. 1663]
Tinsley #1	1-2/3 bbl/day	14 bbl/day [R. 1663]
Beyham #5	2 bbl/day	45 bbl/day [R. 1662]
O'Connell #1	6-1/2 bbl/day	20 bbl/day [R. 1662]

These increases in production are comparable to increase of production of wells of similar capacity treated by defendant's operations. Defendant is charged with infringement in treating three wells for the Weber Oil Company. Of these, the Stella Wilcox well was producing about twelve barrels per day before treatment. After treating with acid "production was increased probably by two thirds for at least thirty days." [R. 302.] The Zahn well

was increased from 5 or 6 barrels a day to 10 or 15 barrels per day [R. 303]. The Crawford well was not pumped long enough after treating to find out if it was improved [R. 303-304].

Although these early wells were small judged by the present day standards, in most cases Frasch's treatments resulted in increased flow of oil [DX 144-5; R. 1657, 1658]. The method was tried upon some dry holes. No production of oil was thereby secured. The method was not one to make oil, and oil cannot be produced where it does not exist. That the use of the process was carried on by Frasch for nearly two years is proven by sundry articles published in the Oil City Derrick [DX 143-149; R. 1656-1663]. That this work was on a commercial basis [R. 1043] and was successful is shown by the fact that it was paid for by the owners of the wells [DX 109; R. 1896-1900]. On July 25, 1895, Frasch and Van Dyke solicited an opportunity to treat a well for the Ohio Oil Company. The letter of Van Dyke to Mr. Lufkin was a proposition that the Ohio Oil Company furnish Frasch and Van Dyke "a well comparatively new, reasonably free from salt water and in producing territory, by this I mean to convey to you that we want an oil well which there would be a chance of improving with our method; we do not want a dry hole, or a well in such a condition that nothing would improve it," and that Frasch and Van Dyke would treat the well at their expense and if the flow of the well was sufficient to warrant Ohio Oil Company paying Frasch and Van Dyke for their material, this should be done and Mr. Lufkin was to be the judge [R. 1896, DX 109] [cf. DX 110; R. 1900-1]. A well was furnished and it was suc-

cessfully treated and payment made under the agreement [Cf. R. 1897-1900].

Frasch and Van Dyke treated other wells for the Ohio Oil Company [R. 1657, 1658, 1659-60, 1898-1900].

The mere fact that operations were discontinued by Frasch and Van Dyke does not prove their operations were unsuccessful. Nor does it constitute an abandonment of an invention within the meaning of *R.S. 1886, 35 U.S.C.A., Sec. 33*. On the contrary, this was a use by others in this country before Grebe and Sanford's alleged invention. There was little use for this method at that time. "There weren't many important limestone fields in Ohio, outside of the Trenton field in Northwestern Ohio." [Plaintiff's witness Fitzgerald - R. 179]. The record evidence in this case proves successful use. There is no conflict in the evidence. Such prior use and such prior knowledge is proven by the records. Frasch and Van Dyke's operations were personal to them and not a part of the interest of any producing company. Insufficient financial return to them to warrant their continued use of the process can form no basis for a contention that the process was not successful or that Grebe and Sanford were the first discoverers of such process. It is a notorious fact that modern wells are greater producers of oil than those in 1896. However, many wells today are not benefited by this treatment [R. 37, 194, 195]. The testimony of Mr. Irish, [R. 1040-1052] a business associate of Mr. Van Dyke's, who was with him in Ohio at the time of these treatments and associated with him all during Mr. Van Dyke's business life, discloses that Mr. Van Dyke became interested in a paper mill at Middleton, Ohio, and had other large interests

which he was developing and carrying on, [R. 1045] and moved to Philadelphia, and that Mr. Frasch was developing and carrying on the mining of sulphur in Louisiana [R. 1046].

The Frasch Patent.

On *June 27, 1895*, Frasch filed an application for patent upon this method of increasing the flow of oil wells. On March 17, 1896, patent 556,669 was granted to Frasch and Van Dyke [R. 1935-8]. The application for this Frasch patent proves that approximately four months before the publication of the Oct. 10, 1895 Oil City Derrick article, Frasch had constructively reduced his invention to practice. By this patent Frasch and Van Dyke were granted the exclusive right to use "The method of increasing the flow of oil-wells in limestone formations, by introducing into the well a large quantity of a chemical reagent which is a solvent of the rock (such as hydrochloric or muriatic acid), and subjecting such reagent to strong pressure; substantially as described." [claim 4—R. 1937]. The Frasch patent recognizes that means might be provided for protecting the pipe against corrosion. It states [II: 27-30, R. 1937], "It may be enameled or lead-lined pipe * * * or it may be otherwise made proof against corrosion." Upon March 17, 1913 all residents in this country acquired (by the expiration of the patent) the common, free right to use such method.

The Grebe & Sanford patent states that a chemical method is described in this Frasch patent "according to which the flow of an oil well in a limestone formation is increased by treating with a quantity of an acid, such as hydrochloric acid. The acid has the effect of attacking and

dissolving the rock, thereby enlarging the cavity at the bottom of the well, or the channels and pores in the rock through which oil flows to the well." [R. 1501, ll. 43-52.] Grebe and Sanford in their patent do not assert that the information given in this Frasch patent is not fully sufficient to enable one skilled in the art to increase the flow of an oil well, which well is in a limestone formation and in which formation there exists potential oil production.

The Frasch patent states that "By using enough acid and pressing it back into the rock long channels can be formed and oil reached thereby which otherwise could not be had without drilling other wells, if at all." [R. 1936, ll. 54-58.] It explains the action of the hydrochloric acid as attacking and dissolving the rock, "or, in other words, forms a soluble compound of calcium, such as the chloride, for example." [R. 1936, ll. 63-65.] It states that "By the use of a chemical reagent which forms a soluble salt of calcium the products of the chemical decomposition of the lime stone are removed with the liquid in which the salt of calcium is dissolved, and which conveys the same from the remotest points. The channels which have been cut in the rock are thus left free, thereby securing the maximum increase of the flow of oil as well as of the oil-holding capacity of the well." [R. 1937, ll. 6-15.] It further discloses that "When as much acid as desired, say one thousand gallons, has gone into the rock, a force-pump is connected with the pipe A and fresh water is forced down to displace the acid in the pipe and rock, and by forcing it still farther into the rock extend the area of its action." [R. 1937, ll. 49-55.] It recommends leaving the acid in the well for twelve hours [R. 1937, ll. 55-60]. The method

claimed (claims 4, 5, 6 and 7) includes subjecting the acid in the well to strong pressure to force the acid farther into the rock. It states that: "It is an advantage to confine the reagent outside the supply-pipe to the lower or oil-yielding portion of the well-hole. This can be done by a suitably-arranged packer which shuts off the lower from the upper portion of the hole and prevents the reagent from ascending above the packer." [R. 1936, *ll* 40-46.] It recommends the use of muriatic or hydrochloric acid which contains from 30% to 40% by weight of the acid gas HCl [R. 1936, *ll*. 66-70].

The Record Conclusively Establishes and the Sixth Circuit Court Found That

"It was old to use inhibitors with hydrochloric, phosphorus and other pickling acids to reduce corrosion on iron and steel." [R. 2059, *Cf.* Findings of Fact Nos. 65, R. 1487 and 73, R. 1489].

Thirteen years after the grant of the Frasch patent, Jay C. Beneker (in 1909) was granted patent 914,916 [R. 1941]. Beneker's patent discloses the inhibition of hydrochloric acid by the addition thereto of arsenic compounds [*Cf.* R. 916].

In 1923, Harry N. Holmes was granted patent 1,470,225 [R. 1945] for the use of inhibited hydrochloric acid as a limestone solvent under conditions where there would be corrosive action of the acid on metal, such as pipe, if raw commercial acid were used. The particular use disclosed by Holmes is the removal of scale (such as boiler scale or the like) from boiler sheets or tubes. "Now, the meaning of that boiler scale is a deposit that is left by the evaporation of water in the boiler, and it consists usually

of calcium and magnesium salts, and often is not very far in composition from the composition of rock found in oil wells, or of common limestone. Therefore, the problem of freeing the boiler from boiler scale, or the boiler tubes of the boiler from boiler scale is very analogous to the problem of the patent in suit. You want to dissolve some type of limestone-like formation by means of acid which has to be transported in steel. In this case, one wants to remove the undesirable encrustation from the steel boiler without harming the boiler, and it is that particular analogous application for which I think this patent is most interesting." [R. 916-17.]

In 1923, the American Chemical Paint Company (James H. Gravell, President) commenced the manufacture and sale of a "pickling compound" called "Rodine" [R. 898-901] consisting of hydrochloric acid to which an arsenic compound and other agents were added as inhibitors [R. 899, 901-06], the pickling compound being stored and transported in steel drums [R. 908], and the inhibition of the acid protecting the steel drums against the corrosive action of the acid. "The Court (interposing):—The real purpose of this was to fix it so you could transport it? A.—Yes, sir." [R. 907] "I know that this material had been reduced to a commercially feasible product and had actually been tested in practice at some time before that date." (Oct. 29, 1924, (*Id.*) Mr. Douty, Chief Chemist of the American Chemical Paint Company, further testifies:— "Q.—You couldn't find any record of the sale of inhibitors in this country or the existence on the market of inhibitors prior to what date? A.—Well, as a matter of fact, I don't think that there was a commercial inhibitor sold in this country before 1920." [R. 927].

In acidizing oil-wells it has been the regular practice of plaintiff to use this Gravell method of transporting acid [R. 130-1, 132, 1149-50] *cf.* F.F. 53, 54 – R. 1484.

On *December 11, 1925*, James H. Gravell, president and founder of American Chemical Paint Company [R. 897], filed application for letters patent upon "The method of preventing an acid solution from attacking a steel transportation or storage drum containing it which consists in dissolving in the said acid solution a material capable of precipitating a substantial protective coating on steel, and allowing the admixture to contact with the inner steel surface of the drum." [claim 1 – R. 1948]. Patent 1,678,775 on this application was granted July 31, 1928 [R. 1947]. Claim 4 of this patent defines the method as consisting "in admixing with the said acid solution arsenic compound and organic bases, and allowing the admixture to contact with the steel drum." [R. 1948-9], and claim 7 defines the invention as "A composition of matter for preventing the action of acid solutions on steel drums consisting of an admixture of arsenic compound and organic bases." [R. 1949]. This patent states: "However, if arsenic trioxide is added to the material substantially as follows

Organic bases.....	.25 gals.
Hydrochloric acid.....	.75 gals.
Arsenic trioxide (As_2O_3).....	.125 bbls.*

the material may be shipped and stored in steel drums due to the protective coating formed, precipitated or deposited on the inner surface of the drum. Although arsenic plates

*"bbls." should be "lbs." – R. 1362.

out, the organic bases are not affected sufficiently *to make any difference in the commercial use of the material.*" [R. 1947, l. 85—R. 1948, l. 13]. Here this Gravell patent discloses to the world that the presence of the arsenic trioxide or the presence of the organic bases does not affect the hydrochloric acid in the effective use which is to be made of the acid. Of this quoted statement, plaintiff's expert Alquist says: "I would take that to mean if he had the organic bases and the acid, that the arsenic would plate out of that particular mixture, and that that did not interfere with the use of the material later. That is what I take it it means." [R. 1362].

The Gravell* patent does not limit its claim or disclosure to any particular use to be made of the inhibited hydrochloric acid. The patented invention is a method of *transportation* or storage of such acid. Running the Gravell inhibited acid down through the oil-well casing or tubing is transporting it to the bottom of the well. Plaintiff's expert Prutton says:— "Then for transporting it, that is, conduit through which we can run the acid, we have glass tubing, such as Pyrex glass; we have rubber-lined steel pipe; we have ordinary rubber hose; we have

*In this suit defendant counterclaimed on this patent. It was adjudged invalid [R. 1492]; defendant did not appeal. The inhibited acid of this Gravell patent enabled its transportation to the well in ordinary steel tanks. The tanks are used to haul acid every day and on each trip it is normally necessary to have the acid in them for many hours while loading, hauling or waiting at the well. Prevention of corrosion of the tanks is important. The pipe in a well, however, is subjected to contact with the acid only during the time the acid is being pumped down the well. This time is relatively short. In treating the three wells relied on herein to prove infringement, the acid was in contact with the pipe 8, 25 and 145 minutes, respectively [R. 773]. The amount of corrosion during such periods of contact is negligible [R. 462, 463, 659, 660]. When plaintiff started acidizing wells, it used steel tanks [cf. R. 1149, 1150].

Hovag piping, or Bakelite piping; we have hard rubber pipe, and those are the principal conduit materials that are used in transporting hydrochloric through a conduit." [R. 1145]. In the Grebe & Sanford patent the purpose of these inhibiting substances is to prevent the acid from dissolving the metal surfaces ("iron or steel, copper, etc.") while substantially the full power of the hydrochloric acid is retained to dissolve limestone. The proportions of hydrochloric acid and arsenic trioxide, set forth in this Gravel patent, quoted example or formula, are the same as the proportions of hydrochloric acid and arsenic trioxide given in the Grebe & Sanford patent, to wit: "The amount of arsenic compound added may be varied, but we have found that from 1 to 5 per cent thereof, based upon the weight of the solution will be satisfactory for the purpose." [R. 1501, // 84-8].

The Addition of a Corrosion Reducing Agent to the Acid Produced No New Result: It Did Not Change the Effect or Manner of Dissolving the Limestone Formation: It Merely Substituted One Known Means for Reducing Corrosion of the Metal Equipment of the Well for Another Known Means. This Was Not a New Process. No Invention Was Involved.

The Record Conclusively Establishes and the Sixth Circuit Court Found That

"The only novel element here was that applicant first charged the inhibited hydrochloric acid into the limestone formation through the pump tube. The application of these two old principles to an oil well and the obvious step of conditioning the acid through the pump tube did not constitute invention in view of the prior art used in this case. All that was re-

quired or expected was mechanical skill. No new result was achieved." [R. 2055, *Cf.* Findings of Fact Nos. 76, 77, 81, R. 1489-90.]

It is an admitted fact in this case that the so-called inhibiting agent has only its old purpose and effect, of reducing the corrosiveness of the acid incident to its contact with the metal parts; that it has no effect upon the action of the acid in dissolving the limestone in the well formations. The inhibiting agent is solely for inhibiting or reducing the corrosion incident to the acid passing or coming in contact with the metal parts. "Merely bringing old devices into juxtaposition, and there allowing each to work out its own effect without the production of something novel, is not invention. No one by bringing together several old devices without producing a new and useful result, the joint product of the elements of the combination and something more than an aggregate of old results, can acquire a right to prevent others from using the same devices, either singly or in other combinations, or, even if a new and useful result is obtained, can prevent others from using some of the devices, omitting others, in combination.' *Hailes v. Van Wormer*, *supra*. (20 Wall. 353, 368)." Having quoted this statement of this general principle (247 US 426, 432-3), this Court in *Grinnell Washing Mach. Co. v. Johnson Co.* proceeds (*Id.* p. 434), to further clarify it:— "Applying the rule thus authoritatively settled by this court, we think *no invention* is shown in assembling these old elements for the purposes declared. No new function is evolved from

this combination; the new result, so far as one is achieved, is only that which arises from the well-known operation of each one of the elements." *Germer Stove Co. v. Art Stove Co.*, 150 F. 141, 145 (C.C.A. 6), applied this rule of want of invention, saying:— "Germer has done no more in his first claim than to unite the Condit fire pot with a grate in which the amount of air might be controlled by a damper. There is nothing new in his fire pot, for it is the fire pot of Condit. There is no invention in his grate, for grates in which the supply of air may be regulated were not new. The claim covers a mere aggregation of elements, the fire pot and the fire grate each producing its own effect after as before the combination, each operating in the combination as it did before. The mere bringing together of old parts and allowing each to work out its own old effect, without producing some new product or result as a consequence of the union and co-operating action, is a mere mechanical juxtaposition. *Goodyear Tire & Rubber Co. v. Rubber Tire Wheel Co.*, 116 Fed. 363, 370, 53 C.C.A. 583; *Overweight Counterbalance Elevator Co. v. Henry Voight Mach. Co.*, 102 Fed. 957, 43 C.C.A. 80." It is undisputed in this case that mixing arsenic trioxide or other inhibiting agent with hydrochloric acid is solely for the purpose of reducing the corrosive effect of the acid upon the metal parts; that there is no new or theretofore unknown action or result produced or secured through such mixture. Two old results are secured when such mixture is transported in steel drums to the well and down through

the metallic pipe to the cavity at the bottom of the well. These are: *1st*, the amount of corrosion of the metal parts is reduced or controlled; and, *2nd*, the limestone at the bottom of the well is dissolved. The reduction of corrosion of the metal parts is separate and distinct from any dissolution of the limestone formation, and neither is affected by the other.

In *Grosjean v. Panther-Painco Rubber Co.*, 113 F. 2d 252 (C.C.A. 1), the Court had before it a patent upon a process or method defined in claim 1 of the patent (113 F. 2d at 254). This claim was held invalid for want of invention, the Court saying: "The patentee discloses here an aggregation of old and known steps to construct soles substantially similar to those already known in the art. Such an aggregation is not patentable when no new and useful result is produced and mere aggregation is not invention either in processes, machines, or manufactures. (Walker on Patents, Deller's Ed., Vol. 1, Section 42, p. 218.) What the patentee actually did here was to use old devices for analogous purposes. This is not invention. (Walker on Patents, Deller's Ed., Vol. 1, Section 43, p. 226 and cases cited.) The aggregation did not perform nor produce any new or different function or operation than the elements that composed it had already performed or produced. Cf. *Lincoln Engineering Co. v. Stewart-Warner Corp.*, 303 U.S. 545, 549, 58 S. Ct. 662, 82 L. Ed. 1008; *Tropic Aire, Inc. v. Cullen-Thompson Motor Co.*, 10 Cir., 107 F. 2d 671, 673. Each of the steps disclosed here reflects a function previously performed.

There is no joint function performed to produce a new result, as the plaintiffs contend in their brief that would make the aggregation patentable. The court stated in *Hailes et al. v. Van Wormer et al.*, 20 Wall. 353, 372, 87 U.S. 353, 372, 22 L. Ed. 241, 249, and it is applicable here: 'No new operation is given to it by the combination * * * Each [device] produces its appropriate effect unchanged by the others. That effect has no relation to the combination; in no sense can it be called its product.' *Bauer Bros. Co. v. Bogalusa Paper Co.*, 5 Cir., 96 F. 2d 991, 994, 995."

Cf. *Weir Frog Co. v. Porter*, 206 F. 670, C.C.A. 6; *Kellogg S. B. & S. Co. v. Michigan Bell Tel. Co.*, 99 F. 2d 203, C.C.A. 6; *Ranco, Inc. v. Greyne*, 128 F. 2d 437, C.C.A. 6; *Fort Pitt Supply Co. v. Ireland & Mathews Mfg. Co.*, 232 F. 871, 874, C.C.A. 6.

The situation here is clearly comparable. The Frasch patent recorded and thereby made public for all time the fact that hydrochloric acid used to dissolve the limestone formation of oil-wells would increase production; it was also common public knowledge that hydrochloric acid would attack metal, including the oil-well casing pump tubing and metal parts in the well, and it was also public knowledge that this corrosive action of the acid upon such metal parts could be reduced or inhibited by the use of arsenic trioxide and by each and every one of the "Other inhibitors" mentioned in the Grebe & Sanford patent. The principle applied in *Oxford Varnish Corp. v. General Motors Corp.*, 120 F. 2d 44, 47 (C.C.A. 6).

applies equally here:— "A combination of old elements does not secure a patentable process because it produces a refined or improved result unless the new result is attained in a new way."

Plaintiff here stresses the fact that it was the first to use inhibited acid to dissolve limestone formation in an oil well. As to the inhibition of the acid it admitted that its sole purpose was to reduce "the attack of the acid upon metal surfaces,"—the well equipment; that in the performance of dissolving the limestone formation the acid was unaffected by the presence of the inhibitor [R. 323-4]. It is an established fact that the use of hydrochloric acid to dissolve limestone formation was presented to Grebe and Sanford by the Pure Oil Company. The fact that some of plaintiff's technicians had theretofore had knowledge of and used inhibitors in hydrochloric acid, cannot assist plaintiff in attempting to support patentable invention. This is well expressed in *Bauer Bros. v. Bogalusa Paper Co.*, 96 F. 2d 991 (*supra*) wherein the Fifth Circuit Court of Appeals had before it a patent upon a method or process and said, at p. 995: "It is interesting to note that, as the patentee under number 1,711,706 went about his scientific study of the structure of wood and its responses to various stresses and strains, he found machines already manufactured with which to test his theories and demonstrate his discoveries. With the aid of the knowledge thus obtained, he was able to assemble these machines into the aggregation described, but this does not prove invention. He may have contributed to the

useful knowledge bearing on the art, but even this does not prove novelty within the patent laws, since he was merely explaining phenomena familiar to the art. Indeed some of the greatest contributions of useful knowledge are outside the operation of patent laws, since they do not amount to invention or discovery of any art, machine, manufacture, or composition of matter. In the language of the patent law, a process is an art. *Cochrane v. Deener*, 94 U.S. 780, 788, 24 L. Ed. 139."

It having been known to the public, long prior to Grebe & Sanford, that agents such as arsenic compounds and organic bases could be put in hydrochloric acid to inhibit or prevent action of the acid on iron, no invention was involved in putting such agents in hydrochloric acid for use in the Frasch process. To do so does not constitute a new process. It is merely the substitution of one known agent for another in the old Frasch process. *DeLamar v. DeLamar Min. Co., Ltd.*, 117 F. 240 (CCA 9); *Farrell v. Boston & M. Consol. Copper & Silver Min. Co.*, 121 F. 841; *Baker v. F. A. Duncombe Mfg. Co.*, 146 F. 744 (CCA 8); *James Brown et al. v. Enoch Piper*, 91 US 37; *King v. Gallum*, 109 US 99; *Lovell Mfg. Co., Ltd. v. Alanson Cary*, 147 US 623. Grebe and Sanford only adopted means equivalent to that suggested by Frasch for protecting pipe against corrosion. "There was no invention . . . in substituting one known material for another in the same or an analogous art. *Firestone Tire & Rubber Co. v. United States Rubber Co.*, 6 Cir. 79 F. 2d 948." (*Paine & Williams Co. v. Baldwin Rubber Co.*, 113 F. 2d 840, 844 - CCA 6.)

Dilute Acid.

Hydrochloric acid is hydrogen chloride gas (HCl) dissolved in water.¹ In industrial use, the acid is commonly used at less than full strength. If stronger than 20% it gives off dangerous fumes.²

One of the common uses of hydrochloric acid is to clean metals. *General Chemistry for Colleges*, page 147. When used for this purpose, the commercial or muriatic acid is usually diluted. The patent to Beneker No. 914916 [R. 1941], granted March 9, 1909 on "Wire and Metal Cleaning Bath" states: "In the *usual* process for cleaning or pickling, the wire, rods or black sheets are subjected to the action of a *dilute* solution of sulfuric or hydro-chloric acid." [R. 1941, ll. 11-14].

¹"Hydrogen chloride is a colorless gas which produces a suffocating effect when inhaled. . . . On account of its great solubility, when it streams into the air it condenses atmospheric moisture into a fog of drops of hydrochloric acid." *General Chemistry for Colleges*, by Alexander Smith, 2nd Edition 1916, The Century Co., Page 144. Commercial hydrochloric acid is commonly called muriatic acid. "The ordinary muriatic acid of trade is an aqueous solution of the acid vapor, having a specific gravity of about 1.20 and containing about 40 per cent by weight of dry hydrochloric acid vapor. It is impure, containing sulphuric acid, chlorine, iron chloride, arsenic and generally lead and calcium chlorides." *Outlines of Industrial Chemistry*, by Thorp and Lewis, 3rd Ed., MacMillan Co., 1917, Page 91.

²"Hydrochloric acid weaker than 20 per cent does not fume when in contact with moist air while the stronger acid gives rise to dense white fumes which consist in droplets of hydrochloric acid. The reason for this is that the hydrogen chloride given off from the strong solution is capable of uniting with water vapor in the air to form a solution having a smaller vapor pressure than the original solution, and therefore droplets of this solution are formed and constitute the fumes." *Inorganic Chemistry*, by Cady, 1st Ed. McGraw-Hill Book Co., 1912, Page 128.

The patent to Holmes,³ No. 1,470,225 [R. 1945], granted October 9, 1923 for "Removal of Scale and Rust from Iron and Steel," deals with the removal of "boiler scale" [limestone deposits, R. 916] by the use of inhibited acid. The patent states:— "Hydrochloric acid solutions can be used in various strengths, for example, one volume of commercial concentrated acid to one volume of water, the inhibiting effect being maintained at the higher temperature noted." [R. 1945, ll. 93-97]. Since commercial acid has a strength of 30 to 40%, the solution mentioned by Holmes would be a 15 to 20% "aqueous hydrochloric acid solution."

Prior to Grebe & Sanford's alleged invention the Dow Chemical Company had been using the Holmes (patent 1,470,225) process in removing scale [limestone deposits, R. 916] from tubes in its plant [R. 1421]. The Dow Laboratory at that time had made tests to determine the effectiveness of arsenic compounds as inhibitors in hydrochloric acid ranging in strength from 4 to 22% [R. 1423]. The results as tabulated in the report,⁴ [R. 1423], two years prior to Grebe & Sanford's alleged invention, show the inhibitor in reducing corrosion is not nearly as effective if a 22% solution is used as when a 15% solution is used.

Commercial hydrochloric acid is 70% water. The Grebe & Sanford patent refers to an aqueous solution

³Harry N. Holmes, Professor of Chemistry at Oberlin College.

⁴"Mr. Owen: This is offered to show that when this oil well problem came up Grebe had this information regarding the efficiency of arsenic as an inhibitor. The Court: Dissolving rock, you say? Mr. Owen: No, dissolving scale. * * * Mr. Owen: Yes. It brings to Grebe specific knowledge of the efficiency of arsenic as an inhibitor. They weren't doing anything new." [R. 1421, 1422].

"between about 5 per cent and about 20 per cent." [R. 1502, ll. 1-10]. Such a 20% solution would contain 10% less HCl and 10% more water than this aqueous solution referred to in the Frasch patent. It would contain from 7% to 8% less HCl than the 27% to 28% HCl "actually used in his (Frasch) first treatment." (Dow brief, p. 36).⁵

Nothing in the Grebe & Sanford patent would teach one skilled in the art that the degree of dilution of the acid was a critical factor to its successful operation in dissolving the limestone formation of an oil well. At the trial *the difference in corrosion* of metal by different dilutions of hydrochloric acid was the subject of much expert testimony on behalf of plaintiff, but no testimony was pre-

⁵Plaintiff's statement is based on defendant's Exhibit 90 [R. 1889] 27% to 28% acid was shipped by the Grasselli Chemical Company. This exhibit does not state that this acid was used without further water (dilution). The Frasch patent states the acid ("re-agent") is displaced and caused "to penetrate farther into the rock for forcing a neutral or cheap liquid, such as water, into the well, * * *." [R. 1936, lines 83 to 86]. And that "When as much acid as desired * * * has gone into the rock, a force-pump is connected with the pipe A and fresh water is forced down to displace the acid in the pipe and rock, and by forcing it still farther into the rock extend the area of its action." [R. 1937, ll. 49-55].

In the *Oil City Derrick* of October 10, 1895 (Px. 93), there was published a description of the Frasch method as it was actually used. It is there stated:—

"Large quantities of water are used with the acid so that the acid may be carried long distances, and the water be present to take up the rock when it is made soluble. Also the water being under great pressure, binds the carbonic acid gas in large quantities, and again liberates the gas to rush back through the long channels leading to the well, when the pressure is removed by starting the pump." [R. 1652].

presented for the purpose of establishing or explaining or which asserted any difference either in manner, effect, or degree in the dissolving of limestone formation in an oil well resultant from the use of Frasch's acid or plaintiff's 15% acid, or between any different strengths of hydrochloric acid.

The teaching of the Grebe & Sanford patent is merely that the addition of the inhibitor will prevent the attack of the acid upon the metal with which it comes in contact. The use of the more dilute acid is stated as preferred simply because the inhibitor can act more effectively with the weaker acid. This is because the more dilute acid is less corrosive. The strength of the acid is not critical and the patent does not assert that an acid outside the range from 5 to 20% will fail. In fact the patent states "other concentrations may be used, if desired." [R. 1502, l. 12]. The use of the more dilute acid, within the range of 5 to 20% strength, under these circumstances, cannot aid the patent.

A patentee is not permitted to arbitrarily select a point in a progressive change, and maintain a patent monopoly for all operations in that progressive change falling upon one particular side of an arbitrarily selected point. It is only when the selected point corresponds with some physical phenomenon, and the patentee has discovered the point at which the physical phenomenon occurs, that the maintenance of a patent monopoly is permissible. A patent claim must be based on an invention or discovery. If the invention depends upon the alleged discovery of certain limits or points, then no invention has been made if such points or limits do not exist in fact. This rule of law is illus-

rated in the following cases:— *General Electric Co. v. Cooper-Hewitt Co.*, 249 F. 69 (C.C.A. 6); *DeLamar v. DeLamar Mining Co.*, 117 F. 240, 248-9 (C.C.A. 9); *Lauman v. Urschel White Lime Co.*, 136 F. 190 (C.C.A. 6); *Bethlehem Steel Co. v. Niles-Bement-Pond Co.*, 166 F. 880, 883-5; affirmed 173 F. 1019 (C.C.A. 3); *Brady Brass Co. v. Ajax Metal Co.*, 160 F. 84, 89-90 (C.C.A. 3); *David Belais, Inc. v. Goldsmith Eros.*, 10 F.2d 673, 674 (C.C.A. 2); *Kwik-Set, Inc. v. Welch Grape Juice Co.*, 86 F.2d 945 (C.C.A. 2). The rule is firmly established in the decisions of the Court of Customs and Patent Appeals. See *In re Shoemaker*, 83 F.2d 288; *In re Arness*, 95 F.2d 344; *In re Britton*, 115 F.2d 249; *In re Lilienfeld*, 67 F.2d 920, 924; *Innis, Speiden & Co. v. Food Mach. Co.*, 49 Fed. Supp. 723, at 727.

The Grebe & Sanford patent does not state that Grebe and Sanford have found any difference either in kind or degree in the operative effect of more or less dilute or viscous hydrochloric acid in dissolving limestone formation in an oil well or in opening the channels or pores thereof or in displacing the viscous oil therein.

Viscosity.

Plaintiff's brief speculates between operative effects assumed by it to exist between the use of different viscosities of the acid. It states (1) that the more viscous acid would penetrate the rock more slowly under equal pressures (p. 19). The patent does not teach this. Plaintiff's brief states that (2) concentrated acid reacts more violently; that as this reaction proceeds the resulting solution becomes more or less viscous through the formation of calcium chloride which is taken up by the solution

(p. 19). There is no reference to this in the patent. The brief states that (3) the resulting viscous solution of spent acid would have to be forced back into the pores ahead of the unspent acid before those pores could be attacked and enlarged (p. 19), and (4) that the viscous spent acid solution would have to be forced out of the pores by the natural rock pressures before oil could pass through them into the well (p. 19). The patent contains no reference to any such action or effect. On the contrary, the patent states a preferred strength of the aqueous hydrochloric acid solution and says "With such strength of acid the corrosive action thereof upon metals * * * can be largely or substantially inhibited by adding thereto a relatively small amount of arsenic compound or other inhibiting agent." [R. 1502, ll. 13-18]. No other purpose is given in the patent for selecting any degree of strength of the solution or viscosity of the acid. Plaintiff's brief theorizes that the flow of the acid solution into the formation depends only on the viscosity of the acid: "Concentrated acid being about one third more viscous than the dilute acid of Grebe and Sanford, under equal pressures will flow at only two thirds of the speed of the dilute acid." (p. 37). There is nothing in the record to support this statement. No witness was examined upon any such question. Defendant denies the truth of this statement. The rate of flow into the formation must obviously depend just as much on the viscosity of the oil which must be displaced as on the viscosity of the acid. Moreover, the plaintiff's own Chamberlain patent 2,024,718* [R. 1512] sets forth that the effect of viscosity on the flow of acid

*This is one of the patents upon which this suit was originally based. The suit was dismissed as to this patent.

rebut this contention. This patent mentions [R. 1512, ll. 36-44] three factors which affect the pressure required to move a chain of bubbles and liquid globules through capillary earth pores, these being the diameter of the bore, the surface tension of the liquid and the degree of adhesion. Viscosity is "internal friction" of the liquid itself. It is not mentioned in the Chamberlain patent. This patent shows that the pressure necessary to move a fluid in a capillary bore, under some conditions, can be reduced to one per cent merely by lowering surface tension and adhesion. [R. 1514, Col. 1, ll. 59-63.] This is definite proof that viscosity is a minor factor in determining the flow of hydrochloric acid solution into a formation. In fact, this shows that in some cases, at least, the surface tension is at least 100 times as important as the viscosity. It can readily be understood why the plaintiff could not advance the present theory of its brief with regard to viscosity in the lower court. It is completely contradictory to the theory which plaintiff did advance in that court in trying to uphold the Chamberlain patent.

HCl is miscible in water. The proportion of water in hydrochloric acid (HCl in solution) determines the viscosity of the acid. HCl gas is dissolved in water to form hydrochloric acid. The Oil City Derrick publication disclosed that "Large quantities of water are used with the acid so that the acid may be carried long distances, and the water be present to take up the rock when it is made soluble. Also the water being under great pressure, binds the carbonic acid gas in large quantities, and again liberates the gas to rush back through the long channels leading to the well, when the pressure is removed by starting the pump." [R. 1652].

"It is sometimes found, where the rock is close and the channels small, that additional pressure to that had from the hydrostatic column has to be employed, then a pump is used to press the acid back into the rock. In such wells, the acid will be driven into the rock very slowly at first, possibly not faster than a barrel per hour; however, as the acid begins to open up the channels, it is received more freely, and at the finish, it will take the acid and water at the rate of six or eight barrels per hour." [R. 1653].

The physical conditions in oil well holes are so variant that it is not possible to determine that where hydrochloric acid is brought into contact with the formation in the presence of water, or water mixed with oil of varying viscosity, its action in dissolving the formation would be substantially uniform as to modes of dissolution, effect, etc. In such an operation what is to prevent water pumped against the hydrochloric acid, *i. e.* HCl (a gas) dissolved in water, from further mixing and diluting the hydrochloric acid? Defendant denies plaintiff's assertions that there are in fact any differences in kind resultant from the use of a 30% HCl, 70% water solution and from the use of a 20% HCl and 80% water solution. Neither of the District Courts nor Courts of Appeals so found.

"The statement of a process upon the part of a patentee, to be sustainable, must not only clearly distinguish the old from the new, so that the novelty claimed is obvious, but must point out the new steps so definitely, that one wishing to use that process for the production of the desired product, will have a clear chart before his eye."

Cerealine Mfg. Co. v. Bates, 101 F. 272,
at p. 280, (C.C.A. 7).

At the trial plaintiff produced Dr. Prutton and J. W. Rebbeck to testify as experts. Plaintiff did not question either of them respecting any of these speculations and theories advanced for the first time in its brief. Neither was asked whether there was even a difference in degree, much less in kind, between the dissolving action on limestone formation of full strength commercial hydrochloric acid (30% HCl, 70% water) or Grasselli Chemical Company's 27% to 28% commercial hydrochloric acid supplied to Frasch and referred to in Dow's brief p. 36 as "actually used by" Frasch "in his first treatment" and 5% to 20% aqueous solution of hydrochloric acid referred to in the Grebe & Sanford patent. At p. 38 Dow's brief states that the "Acid neutralizes itself quite quickly in the fine pores of limestone. * * * It is usually spent in an hour or less and the record shows one case where it was proved to be spent in 20 minutes" citing R. 203 and 284. The record does not support this assertion. The reference R. 203 is to a statement in an article by Mr. Chapman of the Chemical Process Company wherein, *inter alia*, it was stated:—"The well was allowed to be shut in 20 minutes awaiting chemical reaction." Plaintiff's attorney Mr. Owen objected "If it is for the purpose of cross-examining the witness, all right, but it doesn't prove the facts stated in the document." To which objection the trial court ruled: "I think that is right. It is more advertising by a third party." The reference R. 284 is to the testimony of Carl A. Nicholas (an operator for defendant), who at R. 278 stated: "The acid was forced into the well by application of pressure and the well closed in so that the acid could not come out of the well. I do not remember exactly how long the acid was allowed to remain

in the well, but it stayed there a few hours possibly." At p. 284 the witness does not state the acid is "*spent* in an hour or less."

Plaintiff's brief contains no substantial reference to the record as supporting its new theories. On page 18 of its brief plaintiff speculates as to evil consequences of using concentrated acid. Plaintiff's assertions made in the footnote respecting the amount of corrosion on tubing in a certain well are based purely on hearsay both as to corrosion and as to the use of strong acid. The reference to R. 232 is to a published article by Heithecker. This article was not admitted as proof of the facts therein stated. [Cf. R. 213, 214-15.]

From a technical or theoretical viewpoint there is every reason to believe that in so far as the reaction with limestone is concerned, hydrochloric acid of 30% concentration would produce better results than acid of 15% concentration. In support of this statement, we refer to "The Flow of Homogeneous Fluids Through Porous Media" by M. Muskat, Ph.D., Chief of Physics Division, Gulf Research and Development Company, Copyright, 1937, which we will hereafter refer to as "Muskat." This book is one of the International Series in Physics published by McGraw-Hill Book Company, Inc. It is perhaps the most authoritative of any on the subject of the flow of liquid in oil wells.

In considering the relative merits of 15% and 30% concentrations of hydrochloric acid in so far as the reaction on limestone is concerned, this book points out that the rate of flow of any acid through a filter bed involves what is known as Darcy's Law. In simple terms Darcy's Law states that the rate of flow of liquid

through the filter bed is proportional to the area of the bed through which the fluid flows, and is proportional to the pressure across the filter bed, and inversely proportional to the thickness of the filter bed or the length of the path of the flow of fluid. Muskat, Page 55. Darcy's law is subject to many variables. It holds true only in uniform homogeneous media. Obviously, if the rock is full of fissures or crevices or is anisotropic, the law does not prevail.

It is true, as stated on page 14 of plaintiff's brief, that acid of 30% concentration is slightly more viscous than a 15% concentration. The very slight difference in viscosity has no measurable effect on the speed with which the acid penetrates the rock. The viscosity affects the speed of penetration of the rock only in requiring more pressure to move the slightly more viscous fluid. It is quite possible that acid of 30% concentration enters a formation quicker and under less pressure created by the pump at the surface of the well than does acid of 15% concentration. Acid of 30% concentration has a higher density and weighs more than acid of 15% concentration, and in a deep well, at least, would exert a greater hydrostatic head of pressure than would acid of 15% concentration. This would cause the more concentrated acid to enter the rock faster. Actually, the viscosity of the acid does not affect the rate of flow into the rock. The viscosity of the oil in the formation affects the rate of flow of acid in the rock. No acid can flow into the formation without displacing an equal amount of oil, as the oil must be pushed out ahead of the acid. The oil has been in the rock perhaps millions of years and has thoroughly soaked and wetted the rock. The oil has a higher vis-

cosity than the acid.* The selection of a particular viscosity of acid cannot alter the force required to force the oil out.

Moreover, the acid is constantly eating the limestone and enlarging the channels so that flow through the portion of the rock in which it exists is practically unimpeded. The dam which must be broken down to permit the acid to flow into the rock is that formed by the oil and exists in the portion of the rock ahead of the acid. A very complicated condition arises at the places in the

*The viscosity of crude oil varies considerably, depending on its gravity and other factors but the following values are of typical crude oils. In the following table, the viscosities of water, acid and brine are from the International Critical Tables — McGraw-Hill Book Company, 1929, pages 10 to 14. The viscosities of the oil are from Booklet No. 229, "Refining Characteristics of Illinois Crude," by Gustav Egloff, G. B. Zimmerman and J. C. Morrell, published by the Universal Oil Products Company, reprinted from "The Oil and Gas Journal," dated October 27, 1938. The figures given in this publication are in "Saybolt" units of viscosity, and have been converted to centipoises by employing the American Society of Testing Materials "Tables for Kinematic and Saybolt Universal Viscosities No. D446-39."

Viscosity of water at 25° C.	— .894 centipoises
Viscosity of water at 40° C.	— 0.653 centipoises
Viscosity of 15.4 HCl acid at 25° C.	— 1.157 centipoises
Viscosity of 28.6 HCl acid at 25° C.	— 1.529 centipoises
Viscosity of 19.8% CaCl brine at 40° C.	— 1.34 centipoises
Viscosity of 34% CaCl brine at 40° C.	— 3.36 centipoises
Viscosity of crude oil:	
36.7 Gravity oil at 40° C.	— 4.02 centipoises
39.0 Gravity of oil 40° C.	— 4.11 centipoises
41.3 Gravity oil at 40° C.	— 4.32 centipoises

The Dow brief refers to a "viscous calcium chloride brine" (Dow brief, page 14). None of these liquids is properly called viscous. A viscous liquid such as glycerine has a viscosity 80 times that of water (Textbook of Physics by Duff, P. Blakiston's Sons, Philadelphia, 4th Edition, 1920, page 132).

channels, fissures or pores in the rock where the acid first comes in contact with the oil. At this "interface" the acid does not push all of the oil out of the fissures ahead of it. Some oil clings to the sides of the passages and until the acid has reacted with the limestone and enlarged these passages, the peculiar result is that the flow is impeded. The effect is the same as though the rock was actually less permeable. In other words, more pressure is required to force water through an oil soaked rock than is required to force an equal volume of oil, even though the oil has a higher viscosity than the water. This is brought out by Muskat, Page 478:

"Effect of the Differences in Viscosity between the fluids on the Two Sides of the Interface . . .

In truth, however, water and oil are by no means perfectly miscible and hence display a differential surface behavior which results in a retention by the sand of part of its original oil in spite of the flooding action of the encroaching water. The remnant oil will clearly lower the effective permeability of the flooded zone for the water which tends to pass through it . . . And although for analytical purposes this lowering of the original permeability due to the remnant oil may be immediately translated into an equivalent increase in viscosity of the encroaching water, it is important to note that this increase may be so large as to more than counterbalance the fact that the water is strictly of lower viscosity than the oil. In fact, it is quite possible that in actual encroachment systems the effective k/u for the flooded zone is less than that in the oil zone in spite of the lower real viscosity of the water."

(Muskat, pp. 478-80.)

On page 14 of plaintiff's brief plaintiff speculates that 30% concentrated acid "enters the small rock pores more slowly and expends itself on the walls of the well hole and the rock closely adjacent thereto. The resulting spent acid solution is a viscous concentrated calcium chloride brine which must be forced out into the formation ahead of the incoming acid before fresh acid can enter and enlarge the pores." Plaintiff's speculations are contrary to the accepted belief of those who are skilled in this art.* If plaintiff's contentions are correct, acid of 5% concentration would work better than acid of 15% concentration, for the more dilute acid would enlarge the fissures and crevices even farther away from the well bore. Exactly the opposite is the case.

"In some cases 5% or weaker acid has been used along with fast pumping rates in an attempt to delay the action on the lime and accomplish these same results. The fallacy in such reasoning lies in the fact that although 5% acid has a slower rate of reaction on lime than does 15% acid, obviously if 15% acid is put into a formation it will react for a considerable time while being forced away from the well before its strength is reduced to 5%. After this, it still will react for as long a time as would fresh 5% acid. Therefore, 15% acid will not be completely neutralized in as short a period of time as 5% acid even though the reaction rate is faster at the start of the injection."

*Cf. F.F. 62, R. 1487:— " * * * A hydrochloric acid solution acts on limestone and is consumed to produce carbon dioxide gas and calcium chloride, which is very soluble in the solution, and hence, does not tend to stop the action of the acid by formation of a precipitate."

This last quotation is from an article entitled "Gas Well Acidizing in the Texas Panhandle," by Gilbert L. Leach, Dowell, Inc., presented at the Spring Meeting of the Mid-Continent District, A.P.I. Division of Production, Amarillo, Texas, March 21, 22, 1941. Dowell, Inc. is a wholly owned subsidiary of plaintiff, Dow Chemical Company.

The factor of primary importance is not the enlarging of the crevices, fissures or pores of the limestone far from the oil well, but on the contrary is the enlarging of the crevices or increasing the permeability of the rock at or near the bore hole or cavity of the well, since it is this portion of the formation which has to serve as the arteries or conduits which convey the oil into the well cavity.

"As field experience has shown that the smaller producers usually react best to acid treatment, it must be concluded that in so far as the mechanism may correspond to the radial-flow case, the small producers are such because of serious plugging about the well bore rather than because of a low permeability in the main body of the limestone.

"These results may be summarized as follows:

"1. Small increases in the production capacity—up to about 50 per cent—due to acid treatment *may* be **explained** on the assumption that the permeability of a small radial zone about the well bore has been increased from normal to higher values, as well as by removal of radial plugging or widening of extended fractures fed laterally by the limestone proper. Unless the limestone does have extended fractures or is appreciably plugged near the well bore, acid treatment should be relatively ineffective in stimulating production.

"2. Moderate increases in the production capacity—50 to 500 per cent—can be explained on a radial-flow basis only on the assumption that the wells were initially plugged, the extent of the plugging being the principal factor in determining the initial production capacity, so that small producers will show larger responses. They can also be explained equally well by the assumption of the extended-fracture flow.

"3. Increases in the production capacity appreciably larger than 500 per cent, for wells of initially moderate capacity, can be explained only on the assumption that there are extended fractures in the limestone which are penetrated and widened by the acid. Here the smaller producers should show the greater responses, whether their initially small production capacities are due to low limestone permeabilities or small widths of the fractures. For very small producers, increases higher than 500 per cent could also be explained on the radial-flow mechanism of production, although it would have to be assumed that there was initially a condition of *almost complete plugging* near the well bore."

(Pages 427-428, Muskat.)

It therefore seems clear that acid of 30% concentration not only is more effective than acid of 15% concentration to react with the limestone nearer the well bore or cavity, but also better serves to enlarge fissures and crevices and increase the permeability away from the well bore, assuming that an equal volume is placed in the well. The amount of limestone dissolved in the fissures far away from the well bore depends upon how much acid is used, the amount of oil or water pumped in after the acid to force it into the rock, and the speed with which it is injected. The latter depends upon how much pressure is exerted by the pump or by the hydrostatic head of

fluid in the well. The dissolution of limestone far from the well cavity or bore also depends upon the concentration of the acid. The higher the concentration the more limestone is dissolved far from the well. This is stated in the article by Mr. Leach of Dowell, Inc. and presented by him as a fact to the meeting of the A.P.I. While acid of 30% concentration reacts with the rock immediately adjacent the bore hole or cavity, its acid content is not reduced to a strength of 15% until it has traveled some distance from the well bore and it is at that point that its rate of reaction with the limestone is the same as that which 15% acid would have at the point when the latter left the well bore. Acid of 30% concentration just naturally eats more limestone nearer the bore hole and it eats more limestone farther from the bore hole than does a weaker acid.

Introduction of the Acid Into the Well Through the Ordinary Pump Tube Already in the Well.

There was nothing inventive in this. In claims 8 and 9 of the Grebe & Sanford patent the use of the pump tube is included to set forth some utility for the inhibiting agent in the acid.

Long prior to the alleged invention of the patent in suit, the use of the ordinary oil well tubing to convey hydrochloric acid (either dilute or concentrated) into a well had been public knowledge. For example, the patent to Lake 1,498,045 [R. 1549], granted June 17, 1924, cited by the Patent Office Examiner [R. 2026] against the Grebe & Sanford application, recites:

"In accordance with the invention we introduce a suitable acid, such as commercial nitric acid, hydrochloric or sulphuric acid, . . . within the well hole, by passing it

through the rotary tubing. . . . If desired, the acids above enumerated, or other acids, may be diluted or in concentrated form, or for that matter introduced in solution within the well with the circulatory system of the rotary tubing, and thus be forced out of the hole around the tubing after it has acted upon the surface to be cleansed." [R. 1549, ll. 52-67].

In the patent in suit, the acid performs its function of dissolving the formation after it has been discharged from the well tube. The pump tube is used merely as a means for conducting the acid to the bottom of the well hole. It performs this conveying or conducting function in identically the same manner as the pipe A of the Frasch patent.

The record presents no evidence that Frasch conduit pipe A was ineffective or inoperative as asserted in Dow brief, p. 37. Any advantage existent in anything disclosed in the Grebe & Sanford patent respecting simplicity, cost, conduction of the acid down into the well, etc. (Dow brief, pp. 36-37) is to be found in the use of the inhibitor in the acid,—its reduction of corrosion of the metal equipment of the well. Inhibition of the acid reduces the corrosion of the tube but does not change its function or purpose, i. e., a pump tube in connection with a well with an oil pump to raise the oil to the surface; this has absolutely nothing to do with the use of the tube as a pipe conduit for conveying the acid to the bottom of the well. Each of these considerations emphasizes that the purpose of the claim is to point out, as required by R. S. U. S. Sec. 4888 (35 U.S.C.A., Sec. 33), the claimed invention, i. e., the use of an inhibiting agent in the acid to prevent attack of the acid upon metal

surfaces, e. g., of iron or steel, copper. etc., with which it comes in contact. [R. 1501, ll. 76 to 78.]

The Grebe & Sanford patent states that "It is not necessary, however, to add the acid solution through the pump tube, as any other convenient way may be employed. For instance, the pump tube may be withdrawn and a dump bailer used to lower a charge of acid into the base of the bore." [R. 1502, ll. 62-67.]

"It is not invention to change a process, machine, manufacture or composition of matter, by substituting an equivalent for any of its parts; unless the new part, not only performs the function of the part for which it was substituted, but also performs another function, by another mode of operation."

Deller's, *Walker on Patents*, Vol. 1, Page 209, Sec. 40, citing cases.

If as asserted in Dow's brief, p. 37, it be a fact that no suitable pump exists by which concentrated hydrochloric acid could be pumped, the alleged invention here in controversy is not the invention of such a pump.*

*The statements in the Dow Brief such as that on page 38 that "no suitable pump then or now known could be used to pump concentrated acid", is without foundation. In the textbook entitled "Hydrochloric Acid and Salt Cake" by Cummings, Van Norstrand 1923, at page 383, it is stated:

"Formerly, whenever it was proposed to lay out an alkali-works, the very first requirement to be fulfilled was to take care that no pumping of hydrochloric acid should take place on any account. * * *

"Nowadays the position of matters is quite different. Even acid-resistant metallic alloys are known and employed * * *. The difficulty at present consists in deciding which of the many contrivances to choose for pumping hydrochloric acid, but nobody need now shrink from raising not merely weak but also strong acid to any desired height * * *".

Much emphasis is placed in plaintiff's brief upon the contention that the Grebe and Sanford method of using inhibited acid avoids the necessity of pulling the tubing out of the well and re-running it in preparing to acidize the well, as taught by Frasch. The record discloses that in some cases wells have been acidized without pulling the tubing. However, in the acidation of the Weber wells relied upon as infringements, the tubing was pulled and re-run [R. 302, 303].

The Use of a Packer.

Nor is there any foundation for plaintiff's assertion (p. 33): "Furthermore, the suggestion that the acid be prevented from rising to the height of the casing by means of a packer was not practical, as pointed out by the Court in the Tenth Circuit." Neither this contention nor this error of the Tenth Circuit Court has any basis in fact. On two of the three Weber Oil Company wells, packers were used by defendant [R. 287, 295, 304; R. 1811, 1816]. Plaintiff, like defendant, commonly uses packers for confining the acid to the particular formations to be treated [R. 210, 211]. Packers have long been used on tubing in oil wells. Both packers and their use were public knowledge in 1896. This Court in *Honolulu Oil Co. v. Halliburton*, 306 U. S. 550, points these facts out. This Court said: "A packer to separate one stratum of the oil well from another is old in the art" (p. 554). "Packers and pipes with valves in them have long been in use to get what is below the packer free from what is above and without removing what is above" (p. 555).

Forcing the Acid Into the Rock by Pump Pressure.

Plaintiff says that the "Grebe-Sanford process" was a commercial success because it involved pumping the acid into the rock whereas it asserts that Frasch did nothing more than enlarge the bore hole and Gypsy did not force acid into rock. Dow brief, pp. 4, 19, 28, 38, 39, 42, 44, 45, 51, 54, 55. The Grebe & Sanford patent does not describe or suggest that a pump be used *to force the acid into the rock*. The statement is "force the charge of acid out of the pump tube." The patent states:

"It is sufficient merely to pull the pump rod and valves, and to pour the acid solution into the well through the tube." [R. 1502, *ll.* 21-24.]

* * * * *

"In order to force the charge of acid *out of the pump tube* into the *bore* of the well *against the head of oil standing in the hole*, it may be followed by a charge of oil, water or other liquid *sufficient to overcome the head*, or pressure may be applied by other suitable means, e. g., by air pressure or by means of a pump." [R. 1502, *ll.* 33-40.]

The patent does not point out any continuation of the pressure into the rock as material to the operation. It proceeds to say:

"When introduced into the bottom of the well, the acid attacks the rock structure and dissolves or disintegrates it, thereby enlarging the pores and channels in the rock, or opening up new channels." [R. 1502, *ll.* 40-45.]

According to the patent, "The acid solution is preferably added in amount calculated to fill the bore of the well

to a depth not exceeding the thickness of the mineral bearing stratum." [R. 1502, ll. 29-32].

The Frasch patent statement [R. 1937, ll. 49-55] is much more specific in its directions:—

"When as much acid as desired, say one thousand gallons, has gone into the rock, a force-pump is connected with the pipe A and fresh water is forced down to displace the acid in the pipe and rock, and by forcing it still farther into the rock extend the area of its action."

It was Frasch, not Grebe and Sanford, that used water "with the acid so that the acid may be carried long distances." [p. 1652.] It was Frasch who said that "a pump is used to press the acid back into the rock" [R. 1653] and who forced the rock to "take the acid and water" [R. 1653]. It was Frasch, not Grebe and Sanford, that wanted the water present to "bind the carbonic acid gas" generated in the channels of the rock by the reaction of the acid therein [R. 1652]. The only reference in the Grebe & Sanford patent to forcing the acid into the rock is "gas may be allowed to escape up the casing, or the latter may be capped off, thereby creating a gas pressure within the well which assists in forcing the acid into the pores and crevices of the rock." [R. 1502, ll. 48-52.]

Gas generated in the rock itself would not exert such pressure, and gas generated in the well could not force the acid very far. A pump is necessary. Not only does the Frasch patent prescribe the use of a force-pump for this purpose but the article in the Oil City Derrick [R. 1653] refers to its use.

There is no justification for the implication of plaintiff's brief that using pressure to force the acid and water into the formation was patentable invention on the part of Grebe and Sanford (Dow brief, p. 37. cf. (b) p. 14). On the contrary, the Frasch patent and this Oil City Derrick publication made this a part of the public knowledge and demonstrate that such public knowledge was not limited to a dependence "on the hydrostatic head of his (Frasch) acid in the supply-pipe to get the bulk of it into the rock," as asserted in Dow's brief p. 37.

The Gypsy Oil Company's Use.

Early in 1928 the Gypsy Oil Company had a problem in some of its wells in the Glenn Pool field in Oklahoma (a sandstone formation) caused by the formation of limestone scale or "gyp," as it is called, on the casing, tubing, working barrels, and pump rods and face of the sand in its wells; such formation interfered with the pumping of the wells and necessitated frequent shutdowns and loss of time in removing rods, valves, etc. and mechanically removing the scale [R. 1094]. The company sought a suitable solvent which would dissolve such scale while in the well and thereby avoid the frequent "pulling" jobs. It submitted its desires to the Mellon Institute at Pittsburgh [R. 1079, 1083], furnishing the Institute with specimens of the scale for analysis and determination of its characteristics and chemistry. A report by Dr. Wescott on behalf of the Institute was made respecting this "Scale Formation in Wells." [R. 1908-21; Cf. F. F. 66 -

R. 1487-8]. "The purposes of the investigation were to determine the cause of the deposition, to find a method for its removal and to ascertain whether the formation of the scale could be prevented. The first two objectives have been accomplished; the third is still a matter for study at the present time." [R. 1908]. This report discloses an application of public knowledge by chemists (1) that hydrochloric acid was a solvent for limestone, and (2) that the corrosive effect of such acid could be minimized ("inhibited," as this term is used in the Grebe & Sanford patent) by the addition to the acid of the commercially available Rodines. Under the heading, "Removal of the Scale.", the report states:—

"Since the scale was shown to consist mainly of calcium and magnesium carbonates, the selection of a solvent was a simple matter. The scale was easily soluble in all mineral acids but the most suitable one was hydrochloric acid because the products of the reaction of the scale and hydrochloric acid are all soluble and offer no difficulty of removal. The use of an acid in removing the scale involves the loss of some of the metal of the tubing, casing and sucker rods by solution in the acid. The casing in the Glenn Pool field is old and probably more or less severely corroded in spots. The corrosion in areas subjected to scale deposition is probably slight as the scale forms a very efficient protective coating. There are available on the market, numerous patented materials called inhibitors which are used principally in the commercial pickling of iron and steel products to reduce the loss of metal by solution in the acid. Some of these materials are very efficient in their action in dilute acids. Among

the most successful of the inhibitors are a series of materials called Rodines, manufactured by the American Chemical Paint Company of Ambler, Pa."* [R. 1913-14].

"* * * There is no doubt that for the purpose at hand that Rodine No. 2 will prove most suitable. It not only affords greater protection but is much easier to handle since it is a liquid.

"The results given in Table 5 indicate that perfect protection to the steel could most probably be insured by the use of sufficient Rodine. It would not be economical to do that however. * * *" [R. 1915].

Under the heading, "Theory of Inhibitors," it is stated:—

"The commercial use of inhibitors for the protection of metals in acid solutions is not new. A very great number of substances have been studied for their inhibitive value; some have been good, others worthless. There has been no definite relation indicated between chemical properties and inhibitory value. The mechanism of the inhibitive action is very little understood. Some inhibitors are colloidal in nature and it has been noticed that the over-voltages at anode and cathode in acid is increased proportionally to the colloid concentration. Some substances, such as formaldehyde and quinoline ethiodide exert powerful inhibitory action when only very small amounts are present, suggesting that the effect is

*"Prior to Letters Patent 1,877,504, it was well known that numerous agents, including the preferred agent (arsenic compounds) mentioned in Letters Patent 1,877,504, could be added as inhibitors to hydrochloric acid to reduce the corrosive action of the acid upon metals such as steel." [F.F. 73 - R. 1489; Cf. F.F. 75, 76.]

catalytic in nature. It has also been suggested that the inhibitor forms some sort of film over the cathode which acts to prevent the ready evolution of hydrogen. The most recent explanation advanced for the action is as follows:

"Iron immersed in acid goes into solution at the anode areas, forming iron ions in solution and depositing an equivalent amount of hydrogen ions at the cathodic areas. These cathodic areas are assumed to occur principally in the grain boundaries of the crystals in steel or at the interface of slag and iron in wrought iron. Most inhibitors are either organic bases or positively charged colloids, and when these are present, they travel to the cathode areas with the hydrogen. When the positively charged heavy particles of the inhibitor are discharged at the cathodes, they cannot escape by gaseous evolution, and accordingly are absorbed on the surface building up a protective layer." [R. 1916].

The report recommends "that the removal of the scale by use of hydrochloric acid and 4% of Rodine No. 2 or other inhibitor of equal effectiveness be tried in one well of the Glenn Pool." [R. 1921]. Among the conclusions stated in the report were: "The only economically available solvent for the scale is hydrochloric (muriatic) acid." "Hydrochloric acid treated with a sufficient amount of a suitable inhibitor may be used without fear of damage to sucker rods, tubing, casing or other ferrous materials in the well." "Rodine No. 2 (or other Rodines having like inhibitive value) used in the proportion of 3% to 5% by volume of acid affords ample protection to the ferrous materials in the wells." [R. 1920-21].

With respect to Gypsy Co.'s operations, Dr. Knappen testified: "The purpose of giving that well (Berryhill No. 8) treatment was both to increase the production from the well and also to reduce the amount of operating trouble in the well. If we could remove the scale from the face of the sand we could increase the production. * * *." [R. 1085]:

This purpose is not something that occurred to Dr. Knappen after the Grebe-Sanford patent issued. The Wescott report of June, 1928, stated: "The release of pressure probably occurs at the surface of the sand in the well cavity, in which case it is reasonable to suppose deposition of more or less of the *scale on the surface of the sand*. Therefore, the trial would be well worth the expense for its possible value *in increasing the production* of the well *entirely aside* from the object of removing the scale from the pipe." [R. 1921].

While the Wescott report suggests the commercial acid (30% HCl, 70% water) be placed in the well, it was not the intention that the acid remain undiluted in the well. The wells were producing water with the oil [R. 1073, 1911]. The report states that Table 5 indicates that *perfect* protection of the steel could most probably be insured by the use of sufficient Rodine; that it would not be economical to do that; and that the corrosion reduction results indicated in the table "are considerably higher than those that would actually be met with in practice because of the dilution of the acid by fluid material in the wells" [R. 1915]. Wright, the field engineer who mixed the Rodine with the acid, testifies that it was "dilute hydrochloric acid" [R. 1066].

On *November 12, 1928*, the Gypsy Oil Company's Berryhill No. 8 well in the Glenn Pool was treated with hydrochloric acid containing Rodine No. 2 purchased from American Chemical Paint Company [R. 1078, 1094]. This treatment "was a complete success from the standpoint of well trouble, and there was no subsequent gypped tubing in this well for many months." [R. 1096]. Similar treatments of other wells followed [R. 1102, 1109]. "Use of the inhibited hydrochloric acid in the wells of the Glenpool by the Gypsy Oil Company was scientifically successful, but economically unsuccessful, because the acid was costing us forty cents a gallon and we were dealing with small wells at a time when the price of oil was very low. It saved money in the operation of the wells over what it cost to operate them without using the acid. I believe there was some increase in production by use of this acid rather than our old cleaning-out method, but I cannot put my finger on precise figures because the wells were pumped into a lease tank battery so that many wells were produced into the same tank." [R. 1080]. "There were economic or other reasons why the Gypsy Oil Company did not in the year 1928 and '29 further pursue the method of attempting to increase their production with the use of inhibited hydrochloric acid. The cost of acid was approximately forty cents a gallon, making the cost of treatment of any of those wells very high. At that time we had more than two million barrels of Glenpool oil in storage. We foresaw a decrease in the market price and had no desire to increase our reserves and accordingly decided to delay further acidizing operations until we had either a shortage of that grade of oil or a more favorable market." [R. 1089]. "Our question was whether it was saving us

enough money to justify the work." [R. 1009] Cf. F. F. 66, 67, 74 [R. 1487-9].

Plaintiff argues that production on Berryhill No. 8 was not increased by the acid treatment. The record does not conclusively establish whether or not there was an increase [Cf. R. 1080, 1085]. It is not material here whether the oil production was increased (*Smith v. Hall*, 301 U. S. 216 at p. 232) [Cf. comments, *District Court* -- R. 1435-7]. Whether or not an increase in production resulted, inhibited acid admittedly was used by Gypsy Co. and its use was successful* [R. 1456; Cf. R. 1096].

There is no difference between this use and the use contemplated by the patent in suit. The Grebe & Sanford patent [R. 1501] states the object of the alleged invention "is to counteract some preventable natural causes for the decline of yield of a well," [ll. 8-11] caused by "the building up of solid deposits of wax or the like in the channels and pores of the oil-bearing rock which obstruct and finally may cut off altogether the flow of oil to the well." [ll. 24-28.]

Plaintiff advertises [Exs. 242, 243; R. 1790, 1791] its "Lime Scale Removal" Process, and initially included such treatments in its exhibit [Ex. 94, R. 1655] showing commercial success of the patent in suit [R. 166, 845]. There is no essential difference in the action of hydrochloric acid after it is in the well whether the formation is limestone or sandstone. If there is any lime in the sandstone formation, the reaction would be the same [R. 37].

*The problem of preventing the formation of gyp by the use of acid has nothing to do with Dr. Wescott's recommendations [R. 1121]. This problem does not pertain to the Grebe-Sanford patent.

Plaintiff based its suit against Williams Bros. on the treatment of a sandstone by that concern. [See record of Williams Bros. case. Phys. Ex. 297, p. 31.]

Plaintiff now seems to admit that the acid used in the Wm. Berryhill No. 8 well reacted with the soluble binder in the sand (Brief, pp. 51, 54). Unless this binder were dissolved, the well could not have filled with sand as alleged.

While a single public use invalidates a patent, *Electric Storage Battery Co. v. Shimadzu*, 307 U. S. 5, 20, the record contains proof of treatments of other wells which followed the Berryhill No. 8 well [R. 1075, 1079, 1101]. Besides the testimony of Dr. Westcott* [R. 1110], the record contains the testimony of the engineering assistant to the vice-president who supervised what was done [Dr. Knappen - R. 1077]; of a graduate petroleum engineer [Wright - R. 1065] who mixed the acid and inhibitor and was in charge of the work in the field; and of one of the men who did the work [Kiser - R. 1075]. This evidence clearly establishes that Berryhill No. 8 well was treated with acid three times; on Nov. 12, 1928 [R. 1922]; Nov. 7, 1930, and Mar. 10, 1931 [R. 1075]. Four other Berryhill wells were treated: #9, July 29, 1929 [R. 1075-6]; #11, Sept. 11, 1929; #26, Aug. 5, 1929; #1, July 25, 1930 [R. 1076]; also three other wells: Vowell

*Dr. Westcott did not testify in the *Williams Bros.* case. In this case he testified [R. 1110-1129] that the conclusions of the Tenth Circuit Court of Appeals as to the work he recommended were not correct, particularly respecting whether experimentation was necessary to determine whether inhibited hydrochloric acid would react with the calcareous deposits in a well [R. 1116-1119]; and whether the results obtained were contrary to the forecasts made in his report [R. 1117, 1120-1121].

#3, Sept. 30, 1929; Gilcrease #22, Sept. 4, 1929, and Rhodes #6, Sept. 20, 1929 [R. 1076]. The records produced specifically show that inhibitor was used with the acid in the treatments, on Berryhill No. 8, Nov. 12, 1928 [R. 1922], and #11, Sept. 11, 1929 [R. 1076, 1077, 1101], and Gilcrease #22, Sept. 4, 1929 [R. 1076, 1077, 1101]. It is these three treatments that are specifically mentioned in the District Court's finding of fact No. 67 [R. 1488]: "That work for the Gypsy Oil Co. was under my supervision. I have the reports and can produce them." [Knappen - R. 1088].

The treatment of these wells by the Gypsy Oil Co. was not an "experiment" in the sense that this word is used in patent law. *Smith & Griggs Mfg. Co. v. Sprague*, 123 U. S. 249, 31 L. Ed. 141. "We had a profit motive for treating these wells" [Knappen - R. 1097]. This use of inhibited acid by Gypsy was not abandoned. "The Gypsy Oil Co. since June 30, 1930 surely has continued to use inhibited hydrochloric acid in oil wells down to the present date. To my knowledge they have never been sued by the Dow Chemical Co. for alleged infringement." [Knappen - R. 1081, Cf. 1097].

While the Gypsy Oil Co. called Dow Chemical Co. to treat some of its wells in 1933, it also called the Chemical Process Co. [R. 1089] and also treated many of its wells with its own equipment without calling any oil field service company [R. 1088].

The reason it called Dow Chemical Co. to treat a well in 1933 was because it had no acid truck available in the field where it wanted to treat the well, whereas the Dow Chemical Co. did have a truck there. "the well was located up in Kansas, remote from the place where we

expected to do most of our work and it was cheaper to employ them (Dow) to treat the well than it was to move our truck and our acid from Seminole (Okla.)" [Knappen - R. 1089].

"The Use of This Very Process Was Suggested to Grebe and Sanford by the Pure Oil Company Prior to the Issuance of the Patent in Suit and Was Not Original With Them."

(Opinion, Court of Appeals, Sixth Circuit [R. 2059].)*

Plaintiff first became interested in the use of hydrochloric acid to dissolve limestone formation in an oil well to increase its production through an inquiry on behalf of the Pure Oil Company. Wm. A. Thomas was employed by the Pure Oil Company as a geologist. "In December of 1931 I had an idea that acid could be used on lime wells in the Greendale pool. I went over to Dr. Grebe, who was in charge of the research at Dow Chemical, and I might say I was introduced to Dr. Grebe by Ross Sanford." [R. 1010]. He went to plaintiff "to get the price on hydrochloric acid." [R. 1011]. He asked Dr. Grebe how much limestone that hydrochloric acid would dissolve. An assistant of Dr. Grebe's gave him the figures [DX 300; R. 1993]. Whether it was Thomas, Dr. Grebe or this assistant who suggested 20% hydrochloric acid is not clear from the record. It is clear that the figures given to Mr. Thomas were based upon 20%

*"The acidizing of oil wells with hydrochloric acid to increase the production of the wells was suggested to the applicants for Letters Patent 1,877,504 by representatives of the Pure Oil Company and was not original with or conceived by such applicants." [F.F. 72 - R. 1489.]

acid.* That plaintiff recognized there was substance to the claim of the Pure Oil Company that it suggested to plaintiff the use of hydrochloric acid to increase oil well production, is definitely proven by the fact that under date of January 31, 1933, plaintiff entered into a written agreement with Pure Oil Company in which plaintiff provided that it "shall grant unto Pure without royalty charge a non-exclusive license under Patent 1,877,504, and under any other patents which Dow may acquire, own or control relating to acid treatment of oil or gas wells," [R. 1874]. This was limited by a subsequent agreement "to the treatment by Pure of its own wells within Michigan." [R. 1878]. This first agreement was entered into after a dispute arose between plaintiff and Pure Oil Company regarding the parts that plaintiff and Grebe and Sanford had in the use of hydrochloric acid by Pure Oil Company in acidizing its wells [Cf. DX 301; R. 1994; DX 302, R. 1998; DX 303, R. 2000].

In February, 1932 an oil-well was treated by Pure Oil Company with hydrochloric acid furnished by Dow Chemical Company. The treatment caused an increase in production and, as a result, several more wells were acidized by Pure Oil Company in the spring of 1932, the acid being furnished by Dow Chemical Company [R. 1018-19].

*"The Court: * * * I take it that you do not dispute that this witness right here (W. A. Thomas) for the Pure Oil Company, went there to get the well treated—is that right? Do you dispute that? That they took the initiative in that regard? Is that disputed at all?

"Mr. Owen: No." [R. 102]. [Cf. F.F. 72, R. 1489].

The record does not show that an inhibitor was added to the hydrochloric acid in the treatments of either the first or second wells by Pure Oil Co. Thomas did not order any inhibitor [R. 1021] and as far as he knows none was used on the first few wells [R. 1015]. The acid was hauled to the well in a wooden tank [R. 123]. The Dow Chemical Co. records do not show that any inhibitor was ordered for Pure Oil Co. in February or March, 1932 [R. 114-16, 136-43] or that any inhibitor was paid for by Pure Oil Co. during these months [R. 141-2]. The written orders from the sales department of Dow Chemical Co. to the acid department of Dow Chemical Co., calling for the delivery of hydrochloric acid to Pure Oil Co. during these months, do not include any arsenic acid [R. 113, *et seq.*]. These orders are PX 231-A—231-J [R. 1777-86]. The first of these orders which mentions arsenic acid is PX 231-C [R. 1779] dated April 4, 1932.

On *April 28, 1932*, Pure Oil Co., through Richard H. Carr as inventor, filed application for a patent upon a method for facilitating the flow of wells by the use of hydrochloric acid to dissolve limestone formations. This application was later rejected as anticipated by the Frasch patent 556,669. This application was abandoned after Carr on *June 30, 1932* filed the application for patent 1,891,667 [R. 1989], which states that: "This invention is a continuation-in-part of the disclosures set forth in my prior application, Serial No. 608,147, filed April 28, 1932." [ll. 17-19].

On June 9, 1932 [PX 14 - R. 1626] plaintiff caused to be published in "The Midland Republican" of Midland, Michigan an announcement and advertisement:

"TREAT WELLS BY DOW PROCESS
TO JUMP PRODUCTION

"New Acid Injection Said to Have Increased
Stripper Flow as Much as 10 Times

"Contracting Work in Midland Field

"A new process of injecting acid into oil wells, which is supposed to increase the porosity of the oil bearing sand and result in a heavier flow of oil from wells which have nearly stopped producing, was announced this week by Dow officials. Oil men are showing a keen interest in the process, which they believe would revive old wells, especially since it has been said to produce as much as ten times the original flow in one stripper. The process in no way affects the quality of the oil.

"The idea is an outgrowth of a process developed for increasing the flow of brine wells. Dow Chemical Co. is contracting to treat wells, but does not take any responsibility for results accomplished. The services of an engineer are to be made available for the new work. Robert Quinlan has been placed in active charge of the work through the sales department. *The acid used is trademarked Dowell and the process covered by application for patents.*

"Since the commercial use of the acid was decided upon the GLeEP firm has been the first to contract for its use. According to Laurence W. Lee, an of-

ficial, one well is being treated while six more are to be given acid in an attempt to bolster production.

"The treatment has been used on a number of wells in the Midland-Isabella field and found satisfactory according to those in active charge.

"Enthusiastic reception by oil men, lease holders and land owners has been given wherever the process and its working have become known. In it, they see possibilities for getting many times the present production from wells, which have practically ceased to be of any value. This may mean the reworking of dozens of sites in the field and stir a new line of activity."

No mention is made in this inspired article that the "new process of injecting acid" included or depended upon the use of any inhibiting material in the acid. The article does not even identify what acid is used. It states, "*The acid used is trademarked Dowell and the process covered by applications for patents.*" However, the application for the Grebe & Sanford patent was not filed until June 30, 1932, three weeks *after* the publication of this article. *Two days prior* to this publication, a draft of an application for patent by John J. Grebe had been prepared [DX 304 – R. 2002-09]. One significant fact disclosed by this draft is that at the time of its preparation plaintiff had no knowledge of the Frasch patent. A second significant fact is that one of the proposed claims was: "1. In a method of increasing the output of a well for producing a fluid mineral product such as oil, gas, water or brine, the step which consists in introducing a mineral acid solution into the mineral bearing rock strata adjacent to the bore of the well." [R. 2007]; that proposed claim 8 [R. 2008]

defines the mineral acid as "a hydrochloric acid solution". This method is particularly described in the paragraph commencing at bot. R. p. 2003.* At this time plaintiff believed this Pure Oil Co. operation was the first use of hydrochloric acid to dissolve limestone to increase the production of an oil well. The reduction of corrosion of the metal parts or surfaces of the oil well equipment presented no problem whatsoever to Grebe and Sanford. It was obvious to them from their familiarity with "the known inhibitors which are used for acid pickling baths and the like" [R. 2005]. This draft does not indicate that plaintiff then thought such method was inoperative "due to the fact that the acid attacks the metallic casing, pump tube, etc. about as actively as the rock, and causes serious damage thereto." [patent in suit - R. 1501, ll. 54-7]. This statement was first made in the revised Grebe & Sanford application, prepared subsequent to a search of the Patent Office records which disclosed the Frasch patent. In this original Grebe application draft, the corrosive action of the hydrochloric acid was acknowledged to be a mere incident which could be minimized by the selection and use of "any of the known inhibitors which are used for acid pickling baths and the like" [R. 2005]. This exhibit DX 304 contains the notation, "Copy of this draft sent to Nelson**

*See District Court's remarks [R. 1437] when considering proposed Findings of Fact.

**Evidently the Almon S. Nelson who made the affidavit [R. 2023-4] in support of the petition [R. 2020-21] that the Grebe & Sanford application S. No. 620,292 "be advanced for special action"; in such affidavit Nelson "averts that he has made a complete and comprehensive investigation through the appropriate classes of patents in the United States Patent Office * * *" and "has failed to find any patent or patents * * *"

at Wash. for use in connection with search. E.C.B." [R. 2002]. The record does not disclose the report upon the search made to ascertain the novelty of the claimed invention. A revised limited application, in the name of John J. Grebe and Ross T. Sanford, was prepared [R. 2012-18] and signed June 24, 1932. This application acknowledges the Frasch patent 556,669 [R. 2013; patent in suit—R. 1501, l. 44]. Plaintiff offered no evidence in explanation of the limitations imposed upon the revised application. No acknowledgment of the Gravel patent 1,678,775 is contained in the revised application. Omission thereof may have been intentional, or the Gravel patent may not have been discovered by Nelson. This fact increases in importance when it is noted that this Gravel patent 1,678,775 was overlooked by the Patent Office in considering the application for the Grebe & Sanford patent.

Oil Makers Company.

In June, 1932, Charles I. Dougherty, Fred Markey, Edgar Lee, and Walter Sprenger, at Mt. Pleasant, Michigan, formed a company to go into the business of acidizing oil wells for others [R. 1195]. In October, 1932 they organized as the "Oil Makers Company" [R. 1256]. Dougherty, Lee and Sprenger were called by plaintiff to testify. This group began acidizing wells in June, 1932 and continued in business for about one year [R. 1195]. Until September of 1932 they used raw commercial hydrochloric acid purchased from Penn Salt Company [R. 1166, 1193, 1196, 1197, 1199]. In September, 1932 they purchased *some* acid from Grasselli Chemical Co. containing "Duclean No. 2", a pickling compound [R. 1174-6, 1178-80, 1193, 1199-1201, 1236]. Plaintiff from 1934 to 1936 or 1937 used a pickling compound called "Murodine" pur-

chased from Mr. Gravell's American Chemical Paint Co. [R. 131].

With both Penn Salt Co. uninhibited acid, and Grasselli inhibited acid, the Oil Makers experienced some trouble due to corrosion [R. 1218, 1220, 1226, 1230]. Dougherty testified: "The trouble was that we left the acid in the well too long, or something." [R. 1222]. At that time, the poor equipment available, and lack of knowledge as to how to proceed, caused trouble for everyone in the business, including plaintiff [R. 1222]. Yet the record shows that these people treated many wells successfully with uninhibited hydrochloric acid, and without material damage to the metal in the well. Thirty-five or forty wells were treated by the partnership with Pennsylvania Salt Co. commercial hydrochloric acid [R. 1225-6].

"From a standpoint of increased production to these wells, we had just about as much success and just as good results when we used the acid from the Pennsylvania Salt Manufacturing Company as we did when using the acid from the Grasselli Chemical Company." [R. 1226; *Cf.* R. 1220-21, 1229, 1231, 1261, 1265-8, 1280-81, 1292, 1299].

"* * * Page 1 of this book, carrying the account of the McClanahan Oil & Gas Company, shows that according to this book we made fifteen treatments for that company. Practically all of these treatments were successful. I don't recall of any complaints of any kind that we have had from this company. The big majority of these fifteen treatments made by the Oil Makers Company for the McClanahan Oil & Gas Company were made with raw acid.

"The next account is that of the Stork Oil Company, for whom the Oil Makers treated three or four wells. I think that all of these acid treatments were successful. I think we made three treatments for them and gave them one free treatment. It would seem that we were using Grasselli acid in treating these wells for the Stork Oil Company." [Dougherty — R. 1220.]

The customers were in general satisfied, as shown by the testimony of Crampton, a superintendent for one of the customers, called by plaintiff to testify [R. 1290-94]. "We were pleased with the results of the first treatments in July and August, 1932, and thought that they were worth while." [R. 1293]. Plaintiff's witness Sprenger, testified [R. 1281] :— "Mr. Lyon:—And you had recovered maybe 30,000 barrels of oil because of this acid treatment, I think you admitted this morning, didn't you, that they would have been glad to have bought several working barrels, if necessary, in order to get the results of that acid treatment? A.—They were a pretty happy bunch." Sprenger's testimony contains page after page of testimony from records he made at the time of the treatments, where damage was done only occasionally [R. 1261-72]. The District Court's conclusions, after carefully considering Sprenger's testimony, were:—

"The Court: I think while this is right here before me, and I don't close my mind to these things until I decide a lawsuit, but I think I will say on the record that my present impression is that these records are genuine. I don't think they have been made up. I may have asked some questions, I always do, to try and find out things, but I think the records are genuine, in other words, that he made them at or about the time he was treating the wells.

"Evidently what he had in mind was whether this acid was going to eat the rock or not and the success of making greater producers. He certainly didn't start out with the idea of how much damage was going to be done to tools, and in spite of the fact he doesn't accept my offered explanation, I am inclined to think it would be a little later that he found out about any damage, that if he did find out was done, and therefore that is to my mind a satisfactory explanation as to why there isn't anything at all about damage in these records he has got.

"I think I should add right on there, however, that there not being a word about damage to any of these wells, he depends entirely on his memory, and we can see as to some of these things, for instance, as to when he began to keep records, and some things, he is quite faulty as to his summary, and this does depend entirely as to the damage and amount of this damage on his memory, and isn't helped in any respect by the record he has made." [1288-9.]

On some of the wells the pipe was old, and it is not possible from testimony to determine whether its condition after acidizing was due to corrosion by the acid or due to rust [R. 1169]. One of the complaints was based on alleged corrosion on the *outside* of the pipe, although the acid had been pumped *through* the pipe [R. 1185].

It is not possible to determine how many of the complaints about damage to the wells were due to competitive activities of plaintiff. From the start, when Dougherty and his associates were using no inhibitor, plaintiff threatened them and their customers. Edgar Lee testified:-

"The Court: You don't know whether some of these fellows that were selling inhibited acid were

there talking to him and telling him what a dangerous thing he was doing to use acid without an inhibitor?

"A. I presume some of the people were, yes, but that I couldn't say.

* * * * *

"Q. And all those fellows selling inhibited acid were claiming that if you did not have inhibited acid, you would get your pipes eaten up?

"A. I presume they were, yes." [R. 1169; Cf. R. 1172-4].

Dougherty testified:—

"The Court: Now, I call your attention to the fact that the Dow patent did not issue until September 13, 1932, and if you are right as to his saying they had the patent I was wondering if it was not later than that, or whether he said they had a patent or going to have. I just call your attention to that, because I can see you are trying to tell me the way it was and all that.

"A. We heard that right from the start, that Dow had applied for a patent or had one, and was going to stop us from using this acid to treat wells.

"The Court: Acid to treat wells?

"A. Yes.

"The Court: Even raw acid?

"A. Well, yes, even raw acid at that time, because there was an appliance of putting it in under pressure and they had that patented, and all that." [R. 1216.]

Before the partnership had actually used any Grasselli inhibited acid [R. 1172-4, 1177-8, 1181, 1238, 1215-16], plaintiff under date of September 23, 1932, notified Oil

Makers that they were infringing the Grebe & Sanford patent 1,877,504. The letter [R. 1172] states: 'You are respectfully requested to immediately discontinue *the use of acid in any manner* which will infringe the rights secured to us by the aforesaid patent.' [Cf. Dougherty's testimony on redirect - R. 1252-3]. The personnel of Oil Makers understood the notice to mean they had to stop acidizing wells, whether inhibitor was used or not [R. 1173].

The Oil Makers had to go out of business because they did not have sufficient capital and because they and their customers were afraid of suit by The Dow Chemical Company:-

"* * * The reason that our company was unsuccessful and had to go out of business was that the price of oil went down in Texas and Louisiana. It was just impossible to make collections. No one wanted to treat their wells to increase production when they weren't getting enough money for their oil.

"Mr. Lyon: Well, if you had had the resources even mildly comparable to the Dow Company to carry through that kind of a situation is there any reason that you know of why you couldn't have gone ahead with the business and made a success of it?

"A. Well, yes, there is one reason why we couldn't. We weren't large enough and there were a lot of the small operators *that wouldn't allow us to put acid in their wells because they were afraid of the suit against them by The Dow Chemical Company.*

“Q. Afraid of being sued—

“A. (Witness interposing) —by The Dow Chemical Company, yes. *They wrote letters to every producer in this field, every company we would treat a well for they would get a letter from The Dow Chemical Company, they were liable to suit with us for infringement.*” [R. 1238.]

Plaintiff attempted, by the testimony of these witnesses, to show that the business of Dougherty and his associates was abandoned because of the corrosion of the casing, tubing, etc. in the wells acidized without inhibitor, but this attempt was wholly unsuccessful.* Milfred Wells testified to the payment to the partnership of \$175.00 for acid treatment on Oct. 24, 1932 [R. 1300]. The well was Hastings No. 1, Greendale Pool, Michigan. Production was increased threefold [R. 1299]. The partnership treated 15 wells for McClanahan Oil & Gas Co., at least the first nine being treated with raw commercial hydrochloric acid: “Practically all of these treatments were successful.” [Dougherty — R. 1220]. “While we were in this business of treating wells with acid, we treated for practically all of the oil companies in Michigan,” [*Id.* R. 1199]. The testimony of Crampton [R. 1292] details the treatment of some fourteen wells, all of which were successful, without any damage or injury to the well equipment or pipe. Crampton testified: “I have experienced damage to three wells as a result of treating them with acid and have had acidized, all told about 400 wells.”

*F.F. 78, R. 1490:— “The rate of corrosion of raw commercial hydrochloric acid upon steel does not result in any material damage to the well pipe or equipment in the well during a great majority of the usual commercial acidizing operations.”

[R. 1294]. A complete reading of the testimony of Edgar Lee [R. 1166-94], Dougherty [R. 1195-1256], and Sprenger [R. 1256-89] discloses the extreme care with which the District Court considered plaintiff's effort to discredit the success of the partnership's treatment of wells with commercial hydrochloric acid. The District Court heard these witnesses, observed their demeanor on the witness stand, and had the advantage of their testimony in full as given. This testimony fully supports the District Court's Findings of Fact 78, 79, 80 [R. 1490].

In the *summer of 1932*, the Oil Makers partnership acidized a well for Pitzer and West at Breckenridge, Texas. Commercial hydrochloric acid without inhibitor was used [R. 1213, 1003]. "Our treatments consisted in just putting the acid into the oil well and displacing it either with water or oil to push it back into the formation. The acid was forced into the formation using whatever method was necessary, either from vacuum or from pressure." [R. 1003]. Pitzer incorporated [Oct. 12, 1932 - R. 1006] "The Chemical Process Company," which engaged in the business of acidizing oil wells. "Prior to the organization of that company I and my associates acidized some few oil wells, less than ten, I would say. Some of these wells were my own, the remainder belonged to others. These wells were located in Stephens County, Texas. * * * We used muriatic acid in treating this well. * * * There was no inhibitor or other chemical used in treating this well. We used just straight acid." [R. 1003]. "Since the organization of The Chemical Process Co. to date that company has made approximately fifteen thousand treatments to oil wells. This work has been done for practically the entire oil business." [R.

1003]. "In these thousands of treatments we have made, we have used an inhibitor on a few wells. We did not use any inhibitor in 1932 or in 1933. We used the last inhibitor on a few wells during the period between the time of the decision in *The Dow Chemical Company v. Williams Brothers Well Treating Corporation* suit, between the time it was tried and reversed. It was between the time of the trial of that case and the time the Appellate Court in Denver reversed it. We only used an inhibitor on a few wells between that time and the time it was reversed. It was not our common practice. After the reversal of that case we never used any more inhibitor and we have not used any since that time."

[R. 1004]. "Out of the numerous wells we have treated with acid for the various oil companies, I think we have received one or two complaints due to the corrosion of the iron in wells. I do not regard the use of an inhibitor as necessary to the successful treatment of an oil well" [R. 1005]. "The acid treatment materially increased the production in this field, and in this district in 1932, I would say, we had anywhere from a two-barrel increase to a hundred-barrel increase per day for each well. I think some of the increases ran even higher than that, but that is just a picture of it." [R. 1005].

"Mr. West, my associate, and I learned of the acidizing business in 1932 from a couple of fellows, named Markham and Melville, who came here and wanted to make an experiment with acid. I never heard of Dowell Incorporated or The Dow Chemical Company having acidized wells prior to the time we started acidizing wells."

[R. 1006]. Mr. Pitzer produced a complete mimeograph copy of record of the wells treated during the first year. It was introduced in evidence as DX 298, but is not re-

produced in the record herein [Cf Pitzer's re-direct examination R. 1007-09]. On January 3, 1934 plaintiff sued The Chemical Process Company in the Eastern District of Oklahoma for infringement of the Grebe & Sanford patent. Upon Chemical Process Company filing an answer denying validity and denying infringement, and filing answers to interrogatories in which it stated that it had not used any inhibiting agent or compound, the suit was dismissed without prejudice on May 8, 1934. Certified copy of the record in this suit is (physical) Exhibit 16.

No further suit was ever filed by plaintiff against Chemical Process Co. for infringement of the Grebe & Sanford patent. In several places plaintiff (Brief, pp. 27, 49, 50) asserts that the use at any time of uninhibited acid by the Chemical Process Co. is not established. The District Court found [F. F. 79, R. 1490] that many wells had been acidized with uninhibited acid. This finding is supported by ample evidence and is not based on Pitzer's testimony alone. The customers of Chemical Process Co. understood the acid was not inhibited.* Plaintiff hired a detective to investigate the activities of Chemical Process Co. He found that it was using a rubber-lined tank in which to haul the acid [R. 1319]. In 1939 this detective obtained samples^{6a} of Chemical Process Co.'s acid from that tank and turned them over to plaintiff's counsel [R. 1319]. Obviously the rubber-lined tank was used because of the corrosiveness of the acid. It was not inhibited

*"I know that the Chemical Process Co. has treated a number of wells for Gypsy or Gulf under my direction and it is my understanding that inhibited acid has not been used by the Chemical Process Co. since the date suit was filed by the Dow Chemical Co. against the Williams Bros. Well Treating Corporation." Dr. Knapp - R. 1092.

against such corrosion. Plaintiff's counsel possessed this information before the trial. Had Chemical Process Co. used inhibited acid it would have been easy of proof by plaintiff.

The Williams Brothers Decision. — Its Erroneous Assumption of Facts, and a Comparison Thereof With the Facts Established by the Record Herein.

The *Williams Brothers* decision is predicated upon an assumption that: "Frasch's method was cumbersome and expensive, and probably impractical because of the inherent difficulty in adequately sealing off the acid at the bottom of the hole. *In any event Frasch's patent met with no commercial success.*" (81 F. 2d 496). No proof was before the Court in that case of any use or attempted use of the Frasch method. Here, the Court heard oral testimony and considered documentary evidence establishing the successful commercial use of such process (*Cf. supra*, pp. 20-24) and found that:—"The method of acidizing disclosed in the prior patent to Frasch, 556,669 granted March 17, 1896, was successfully used on a commercial basis in the acidizing of a number of wells near Lima, Ohio in 1895." [F. F. 71 - R. 1488-9]. The *method of acidizing* disclosed by the Frasch patent was the forcing of raw hydrochloric acid under pressure into the limestone formation to dissolve the limestone (as analyzed, *supra*; pp. 24-26). The specific *method of protecting* the casing, pump tubing, etc.,—the metal surfaces,—from the corrosive action of the acid, described in detail in the Frasch patent, differed from the method of such protection disclosed in the Grebe & Sanford patent. The probative effect of the Frasch patent as a printed publication,

adding to the public knowledge the use of hydrochloric acid under pressure to dissolve the limestone formation, including the removal of the dissolved formation, etc., was not considered by the Court in the *Williams Brothers* case. Plaintiff's argument therein, that the Frasch patent was nothing more than an abandoned experiment, caused the Court to come to an erroneous legal conclusion based upon an assumption of facts in direct conflict with the proven and adjudged facts of the instant case. The *Williams Brothers* decision ignores the fact—and the legal effect of the fact—that the Frasch patent made such method a part of the common knowledge, and that “diligence in unearthing prior patents which have not been turned into commercial success is not invention under the patent statute.” (*W. H. Butcher Packing Co. v. Cincinnati B. S. Co.*—*supra*.) No evidence of the herein established fact that it was the Pure Oil Co. which was responsible for acidizing oil-wells, and not Grebe or Sanford or plaintiff, was before the Court in the *Williams Brothers* case. This fact is conclusively proven by the record before this Court (*Cf. supra*, pp. 66-69) and the District Court so found [F. F. 72—R. 1489]. And no evidence was before the Court in the *Williams Brothers* case that, following Pure Oil Co.'s acidizing of wells, others went into the business of successfully acidizing wells using ordinary available commercial hydrochloric acid [*Cf. supra*, pp. 74-74; and F. F. 79, 80—R. 1490]. While, in a footnote at p. 496 of 81 F. 2d giving a list of “many patents (which) have (been) issued, claiming processes using inhibited acids,” the Gravell patent appears, no other consideration is given thereto. The addition, by this Gravell patent, to the fund of public knowledge is not considered. The opinion states that:—

“What plaintiff did was to combine the Frasch idea of using acid to dissolve retaining limestone in an oil well, with the inhibited acids long used in the steel industry. Does that simple conception involve invention?” The opinion then states:— “At first blush, the conclusion seems irresistible that no inventive genius was employed in substituting an inhibited acid, long known in the steel industry, in the Frasch process.” On rehearing, the Court admitted:— “The case is a close one; * * *” (p. 502). As a premise for its *arguendo*, the *Williams Brothers* opinion, p. 496, states:— “On the other hand, the stubborn fact remains that plaintiff was the first to solve a problem which has baffled all the scientific skill at the command of the oil industry for generations.” The only evidence in the case upon which such statement could be grounded was in the self-serving recitals in the Grebe & Sanford patent [R. 1501, ll. 31-57], at least one of which (the alleged inoperativeness of the Frasch method), is proven false by the testimony and records in the case before this Court (*Cf. supra*, pp. 20-24), and has been found false by the District Court [F. F. 71 - R. 1488-9; *Cf.* 1462]. In the *Williams Brothers* case there was no evidence whatsoever respecting any use or attempted use *by anyone* of the Frasch method of acidizing wells. Successful use by Frasch and Van Dyke is established in the case at bar. The record in the *Williams Brothers* case is devoid of any proof that any scientific skill of anyone—connected with the oil industry or not—was devoted to, or that such worker ever considered, commercializing the Frasch process of acidizing oil-wells. So far as the record in that case or in the case at bar discloses, no one—skilled scientist or otherwise—connected with the oil industry or otherwise—ever knew of, possessed or consulted a copy

of the Frasch patent or attempted to use the Frasch method. There is not a scintilla of evidence in the *Williams Brothers* record or in the record in the case at bar that anyone having before him this full disclosure of the Frasch process of acidizing oil-wells, or having knowledge of the publicly known fact that the corrosive action of hydrochloric acid upon metals could be restrained or reduced by mixing with the acid one of the well-known corrosion-reducing agents, was "baffled" or failed to instantly realize and comprehend that, for Frasch's method of protecting the metal parts in an oil-well from the corrosive action of hydrochloric acid during its progress down into the cavity of the well, there could be substituted a corrosion-reducing agent mixed in the acid. The contrary is proven by the record [DX 151, "Conclusions," R. 1920-21]. Neither the record in said *Williams Brothers* case nor the record in the case at bar contains any evidence or proof whatsoever that any such problem was ever presented to anyone having actual knowledge of the Frasch process of acidizing wells or having a copy of the Frasch patent before him. No one of ordinary scientific or ordinary skill testified in either the *Williams Brothers* case or in the case at bar to having actual knowledge of the Frasch patent or to failing to instantly recognize that the corrosive action of the acid upon the metals could be reduced or inhibited by the use of well-known corrosion inhibitors. This error in the *arguendo* of the *Williams Brothers* opinion arises from the assumption,—against any proven fact,—that anyone of scientific or other skill in the oil industry had any actual knowledge of the Frasch process or patent. The patent law, as a test of novelty and invention, provides that everything that is so constructively public knowledge is conclusively

presumed to have been before the alleged inventor when he conceived his invention. The Court is required to judge the issue of invention upon such irrebuttable presumption. (*Fry v. Rookwood Pottery Co.*, 90 F. 494; *Adams v. Galion Iron Wks. & Mfg. Co.*, 42 F. 2d 395, 397—CCA 6; *W. H. Butcher Packing Co. v. Cincinnati B. S. Co.*, 35 F. 2d 567, 569—CCA 10—*supra*.) Fallaciously, the *Williams Brothers* opinion applies this irrebuttable presumption as a test of "the scientific skill at the command of the oil industry for generations", disregarding the actual fact of want of actual knowledge by even such oil-industry technicians of the Frasch patent or method. "In the absence of a showing that Hixon actually knew of West, no inference can be drawn from a failure upon the part of Hixon to vary his method to embody the teachings of West, when so far as we know, he may actually have known nothing of West." (*In re Stovall*, 63 F. 2d 985—CCPA.) *Cf. Weston Elec. Inst. Corp. v. Dejur-Amsco Corp.* (CCA 2, Feb. 1943, 133 F. 2d 778.) Upon this error the opinion predicates its statement:— " * * * the stubborn fact remains that plaintiff was the first to solve a problem which has baffled all the scientific skill at the command of the oil industry for generations." This error also led the Court in the *Williams Brothers* case into its failure to appreciate the probative force and value of the evidence respecting the Gypsy Oil Co. use of hydrochloric acid containing Rodine No. 2 (*Cf. supra*, pp. 59-68),—particularly the real evidentiary import of the report of the Mellon Institute (*Cf. supra*, pp. 59-62). Wescott's report is a demonstration that in 1928 [R. 1111] control of the corrosive action of hydrochloric acid upon metals was a matter of common knowledge. It is a demonstration

that for such purpose it was common knowledge to use the well-known pickle control and that such agent did not prevent the dissolving function or effect of the acid upon the limestone to which it was applied.* To these facts, the principle of law has been applied in *Herman v. Youngstown*, 191 F. 579, 582, that whether or not the transfer of a device from one art to another and its adaptation to use therein, involves patentable invention, is essentially a question of fact. (Cf. *Phillips v. Detroit*, 111 US 604). In *Blake v. San Francisco*, 113 US 679, it is stated:— “It follows from this principle that, where the public has acquired in any way the right to use a machine or device for any particular purpose, it has the right to use it for all the like purposes to which it can be applied, and no one can take out a patent to cover the application of the device to a similar purpose.” In *Cuno Engineering Corp. v. Automatic Devices Corp.*, 314 US 84, 91, this principle is stated:— “A new application of an old device may not be patented if the ‘result claimed as new is the same in character as the original result’ (Blake v. San Francisco, 113 US 679, 683, 28 L ed 1070, 1072, 5 S Ct 692) even though the new result had not before been contemplated.” (citing cases). Even if it could be adjudged that the Gravell patent does not disclose the use of Gravell’s inhibited acid to dissolve limestone formations in an oil-well, the fact remains that such patent discloses the mixing of an inhibiting agent with hydrochloric acid to prohibit or reduce its corrosive action on steel. It also discloses that the addition is “without

*In the case at bar, the fact that when Pure Oil Co. decided to acidize wells and went to plaintiff to procure the acid, Grebe immediately suggested the addition of an inhibiting agent [R. 2001] is additional proof that no invention or discovery was required.

detriment to the acid solution *for the purpose to which it is intended*" [R. 1948, li. 45-9]. It is not invention, therefore, to merely use "for the purposes to which it was intended" such inhibited acid in the Frasch method of dissolving limestone formation in an oil-well. "It is well-settled by many decisions of this court, which it is unnecessary to quote from or to refer to in detail, that the application of an old process or machine to a similar or analogous subject, with no change in the manner of application and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not before been contemplated." (citing cases). (*Pennsylvania Railroad Co. v. Locomotive Truck Co.*, 110 US 490.) While Dr. Wescott's report [R. 1908-21] makes no reference to the Frasch patent, it does show a knowledge that Gravell's company manufactured and sold inhibitors, —Rodines,—[R. 1914]. No problem was presented to Dr. Wescott. He had actual knowledge of the use of inhibitors. He stated:— "The commercial use of inhibitors for the protection of metals in acid solutions is not new." [R. 1916]. Having determined the chemical composition of the "gyp" [R. 1912-13], to him there remained no problem to be solved respecting the dissolution of the "gyp".* His report says:— "Since the scale was shown to consist mainly of calcium and magnesium carbonates, *the selection of a solvent was a simple matter.* * * *" [R. 1913]. "The

*Dr. Wescott did not testify in the *Williams Brothers* case. He was called in the case at bar and testified [R. 1110-29] that the conclusions of the Tenth Circuit Court of Appeals as to the work he recommended were not correct, particularly as to whether experimentation was necessary to determine whether inhibited hydrochloric acid would react with the calcareous deposits in a well [R. 1116-19]; and as to whether the results obtained were contrary to the forecasts made in his report [R. 1117, 1120-21].

use of an acid in removing the scale involves the loss of some of the metal of the tubing casing and sucker rods by solution in the acid. The casing in the Glenn Pool field is old and probably more or less severely corroded in spots. The corrosion in areas subjected to scale deposition is probably slight as the scale forms a very efficient protective coating. There are available on the market, numerous patented materials called inhibitors which ~~are~~ used principally in the commercial pickling of iron and steel products to reduce the loss of metal by solution in the acid. Some of these materials are very efficient in their action in dilute acids. Among the most successful of the inhibitors are a series of materials called Rodines, manufactured by the American Chemical Paint Company, of Ambler, Pa. * * * [R. 1914]. "The results given in Table 5 indicate that *perfect* protection to the steel could most probably be insured by the use of sufficient Rodine.* It would not be economical to do that however." [R. 1915]. He set forth his determinations of the cost of the treatment [R. 1917-18]. Gypsy Oil Co. found that: "Our question was whether it was saving enough money to justify the work." [R. 1109]. The company at that time "had more than two million barrels of Glenpool oil in storage. We foresaw a decrease in the market price and had no desire to increase our reserves and accordingly decided to delay further acidizing operations until we had either a shortage of that grade of oil or a more favorable market." [R. 1089].

Another error of fact, upon which the *Williams Brothers* opinion depends as an important factor in the rationale

*Dr. Wescott here obviously refers to complete elimination of all corrosive action of the acid upon the steel.

of the opinion is the statement (81 F 2d 498):— "Yet its action for that purpose was exactly contrary to the prediction of the scientists, for it increased the deposit. If the outstanding scientists of the Mellon Research Laboratories forecast the exact opposite of the effect of this inhibited acid in the bottom of an oil well, it must be true that experimentation was necessary to prove that the idea of the inventor would work." On petition for rehearing, the Court admits its error (81 F. 2d 502). But the argument of the original opinion, predicated upon this error, continues upon the assumption that:— "Frasch, an experienced chemist seeking to solve the same problem, failed to conceive the last step which did away with the necessity of his cumbersome, expensive, and impracticable method of getting the acid to the limestone without ruining the casing or tubing;* the capable and practical scientists in the research departments of the great oil companies, confronted for many years with the problem *and the Frasch patent* and their knowledge of inhibited acids in other industries, never thought of this simple solution."** (p. 498). The record did not contain any proof whatever that either any scientist or any practical oil producer had ever seen or was confronted with the Frasch

*There was no evidence whatsoever that Frasch had any knowledge of the use of any agent for reducing or inhibiting the corrosive action of hydrochloric acid upon metals, unless his statement [R. 1937, l. 30] "otherwise made proof against corrosion" be understood to include substituting as the method of protecting the metals, the mixing with the acid of a corrosion-reducing agent.

**There was no evidence that anyone in any of the research departments ever had discovered or knew of the Frasch patent or had any knowledge of inhibited acids in other industries. The fallacy of the factual argument illuminates the error of the Court's conclusion: "That such experienced men came close but missed is some evidence that inventive genius is involved."

patent. In the case at bar, the record likewise totally fails to show any such facts. The arguendo of the opinion states "The patentee expended substantial sums in demonstrating the utility of the invention before applying for the patent. Such experimentation was essential * * *," (81 F. 2d at 498) and speculates upon reasons for this assumed necessity. The conclusion that plaintiff expended any substantial sums in experimentation or that such experimentation was essential was based upon a misconception of the record in that case. However, in the case at bar, the positive proof is that no experimentation was necessary nor was any money ever expended in experimentation. The Pure Oil Company was the instigator of treatment of its wells with hydrochloric acid to increase production (*Cf. supra*, pp. 68, 69).

The Court's misapprehension of the facts in the *Williams Brothers* case is further emphasized by its statement (81 F. 2d 499):— "The inhibiting reagent alone could not dissolve the limestone; the acid without the inhibitor had proven a failure." There was no evidence before that Court that anyone had tried the acid treatment and that it had proved a failure. The Court must have relied upon the false representation in the Grebe & Sanford patent [R. 1501, ll. 43-56].

A further error in the Court's reasoning in this *Williams Brothers* opinion is apparent from considering its statement (81 F. 2d 499-500) that:— "Plaintiff's invention is only useful in oil retained in rock formations which HCl will dissolve; the Gypsy use was confined to wells in a sand which is impervious to HCl." The Grebe & Sanford patent is not limited to use in limestone formations [*Cf. R. 1502, ll. 97-104*]. Plaintiff contended in

this *Williams Brothers* case,—as it does in its brief here, p. 21, that the Gypsy Oil Company “was operating some oil wells in sandstone (predominantly silicious and not acid soluble) where plaintiff’s process is useless.” Accepting this interpretation, the patent claims are therefore broader than the alleged invention. The confusion in the *Williams Brothers* opinion, of the evidentiary import of this fact, in its reference to the Gypsy Oil Company’s operations as “an unsuccessful and abandoned experiment,” and its interpretation of “plaintiff’s invention,” led to specious reasoning. The Gypsy Company’s use was successful in removing “gyp”. Where it was used in a sandstone formation, the proof in the *Williams Brothers* case was uncertain and not definite respecting increase of production. The reason given was that the wells after treatment were pumped into a common lease tank and no actual measurement of production of the individual wells was made. Nevertheless, *Williams Brothers* were enjoined from using inhibited hydrochloric acid upon sandstone formations, which were only six per cent. soluble in the acid [Physical Exhibit PX 297, p. 31].* Actually *the process* is the same whether used to treat limestone or sandstone or to remove “gyp” scale [R. 1097-9]. Plaintiff’s expert Lewis testified [R. 37] :—“Q.—Well, in either case the method is the same in the sense that you perform the same physical operations in introducing acid into the well and causing it to penetrate the formation, and the only difference is, that the effect of the acid will vary with different formations; is that correct? A.—Well, speaking broadly, I think that is correct.” Plaintiff commonly uses the process to treat sandstone formations both to remove scale and to react with the limestone binder in sandstone. Plaintiff has advocated

and advertised the use of the process for sandstone formations [PXs 242, 243 – R. 1790-91].

If the Court's opinion is purged of its erroneous statements and assumptions of facts, the error of its decision becomes apparent.

The record in the case at bar disproves the assumptions of fact in the *Williams Brothers* opinion and demonstrates the fallacy thereof. The facts as found by the District Court herein [F. F. 65, 66, 67, 71, 74 – R. 1487-9] will support only a judgment of invalidity of the Grebe & Sanford patent for want of invention.

Long Felt Want and Commercial Success.

Evidence that a given machine or process has filled a long felt want or need and was commercially successful may be referred to only where all the other proof in the case leaves the question of invention in doubt. In *Slip Scarf Co. v. Wm. Filene's Sons Co.*, 289 Fed. 641, C.C.A. 1, the First Circuit Court of Appeals affirmed the refusal of the trial court to give "requests Nos. 20 and 21, relating to the jury's taking into consideration, on the question of invention, the difficulties existing before the invention that were overcome by the patented invention, that it filled a want not adequately filled before, that it became public and went into extensive use, that the trade acquiesced in the patent by taking licenses, etc., and that others had tried and failed to meet the difficulties," saying: "The rule is that the class of evidence above referred to is to be made use of in determining the question of invention only in a doubtful case. *Duer v. Corbin Cabinet Co.*, 149 U.S. 216, 13 Sup. Ct. 850, 37 L. Ed. 707; *McClain v. Ortmyer*, 141 U.S. 419, 429, 12 Sup.

Ct. 76, 35 L. Ed. 800; American Salesbook Co. v. Carter-Crume Co. (C.C.) 125 Fed. 499.”

“Here the question is not open to doubt, * * *”.
[Opinion, Sixth Circuit Court, R. 2059-60].

There is no evidence in the record that anyone who had knowledge of the Frasch patent or the Oil City Derrick publication ever tried or failed to make the Frasch process operate. There is no evidence in the record that anyone having such knowledge and knowledge of the use of inhibitors in hydrochloric acid, or the patents disclosing such inhibitors, ever attempted to and failed to successfully operate Frasch's process using hydrochloric acid containing an inhibiting re-agent to reduce the corrosive effect of the acid upon the metal equipment of the well. In the absence of such proof the doctrine of fulfillment of a long felt want is not applicable to this case. As said by this Court in *Toledo Pressed Steel Co. v. Standard Parts*, 307 U.S. 350, at 356: “But it does not appear that either was familiar with the relevant prior art.”

Patentable novelty, originality or invention, cannot be ascribed to the use of that which was in fact public knowledge. The Frasch patent and the Oil City Derrick publication made acidizing part of the public knowledge. The Gravell and Benecke patents make the use of inhibitors part of the public knowledge. The fact that these patents and publications were in fact unknown to those skilled in the art does not remove them from the public domain. Nor would the fact that another actually invented such a process independent of knowledge of such Frasch patent

and publication would not make him the original or first inventor thereof under the Patent Statute. On the contrary, his invention was anticipated because it was a part of the public knowledge.

"Bone may have been ignorant of them and his device may not have been their suggestion. They seem to have been unknown to American engineers, not even the interest of the controversy in the sixth circuit having developed their existence. From this local ignorance nothing can be deduced favorable to the patent. Its device having been described in printed publications, although in foreign countries, patentable novelty or originality cannot be asserted for it. Rev. Stat. Sec. 4886, Act of March 3, 1897, 29 Stat. at L. 692, chap. 391, Comp. Stat. Sec. 9430, 7 Fed. Stat. Anno. 2d ed. p. 23. Such is the provision of the law, and we cannot relax it in indulgence to what may seem the individual's merit." *Bone v. Marion County*, 251 U. S. p. 134 at p. 144.

See further *Tashjian v. Forderer Cornice Works*, 14 F. 2d 414, 415 (C. C. A. 9); *Ironclad Mfg. Co. v. Dairyman's Mfg. Co.*, 143 F. 512, 513 (C. C. A. 2); *Fry v. Rookwood Pottery Co.*, 90 F. 494.

"Entirely irrespective of the matter of use, a man is not entitled to the reward given inventive genius, if his invention had theretofore been disclosed to the public through the public records of the Patent Office. The statute rewards invention, and not diligence in unearthing prior patents which have not been turned into commercial success." *W. H. Butcher Packing Co. v. Cincinnati B. S. Co.*, 35 F. 2d 567, 569 (C. C. A. 10).

Although the proof established that the Simmons patented method actually filled a long felt want (Cf. 98 F. 2d 436, at 439-40), this Court, in *Honolulu v. Halliburton*, 306 U.S. 550, held the Simmons patent anticipated by the Franklin patent (306 U.S. at 554, 562), although there was no proof that anyone had ever used the Franklin device for the performance of the Simmons method, and although the description in the Franklin patent was "to control flow and not to test productivity of strata reached before completion of wells, * * *" (p. 562). This Court said of the Franklin device: "Plainly, it may be used as a tester; for by its use the contents of the producing stratum, sealed off from the rest of the well and unimpeded in its entry into the rat-hole by pressure of the rotary mud, can be brought undiluted to the surface by a mechanism almost duplicating that shown by the patent in suit" (p. 554).

In the case at bar—as it did in the *Williams Brothers* case—plaintiff stresses commercial success of the method practised by plaintiff as evidence that invention was required to produce the Grebe & Sanford method.* Commercial success is not proof of invention. (*Lempco Products v. Timken*, 110 F. 2d 307—CCA 6; *American Fruit Growers v. Brogdex*, 283 US 1; *Bulldog Elec. Prod. Co. v. General Elec. Co.*, 105 F. 2d 466, 468-9—CCA 4.) The commercial success of acidizing oil-wells was due to the initiative of the Pure Oil

*"The Court:— * * * now I wish I could have known at the beginning of this case that you conceded that that was what—without it your (*Williams Brothers*) decision would have been the other way. Mr. Wiles:—Oh, certainly." [R. 1460-61.]

Company in utilizing the Frasch method.* Plaintiff pays Pure Oil Co. \$5.00 for every well which plaintiff acidizes (see article II. of contract, Jan. 31, 1933 [PX 369 - R. 1873 at 1874]; and article II. of contract, June 30, 1934 [PX 370 - R. 1877, at 1879].) In such Frasch method, plaintiff has simply substituted one means of preventing or reducing the corrosive action of the hydrochloric acid on the metals in the well, for the specific method of inhibiting such corrosion set forth in the Frasch patent, and in the publications, describing such method. Plaintiff is and was a powerful, wealthy corporation. It organized and operated complete service organizations for acidizing wells. It advertised such service. It is not possible, under the circumstances of the case, to even infer that, had not the acidizing of oil-wells been promoted by such wealthy corporation—placing its prestige behind such operation—the general introduction of such process would have met with success. It must be borne in mind that plaintiff did not disclose what acid it was using. Its representation was that: "A new process of injecting acid into oil wells . . . was announced this week by the Dow officials." [R. 1626 - *Cf. supra*, p. 71]. Its advertisements did not disclose what the new process was [*Cf. letters* - R. 1623, 1618-21]. In order to introduce its "new process of injecting acid into oil wells", plaintiff found it necessary to make an agreement with The Empire Oil and Refining Company by which plaintiff selected ten wells for treatment and agreed to take as payment "\$300.00 per well out of one-half of seven-eighths of the

*"The Court: * * * I take it that you do not dispute that this witness right here for the Pure Oil Co. went there to get the well treated—is that right? Do you dispute that? They took the initiative in that regard? Is that disputed at all? Mr. Owen:—No." [R. 1021.]

increased production", etc. [*Cf.* agreement Dec. 14, 1932, between "The Empire Companies" and plaintiff - R. 1622]. The financial responsibility and prestige of plaintiff, its advertising, its inducement of use of the method by assuming the risk of financial loss, and its willingness and ability to depend upon the money results, were each vital factors in the exploitation by plaintiff of acidizing oil wells. (*Cf. Piston Ring Co. v. Burd High Comp. R. Co.*, 276 F. 357, 367 - CCA 7.) The controlling fact is that creation or use of acidizing wells presented no problem requiring invention or discovery. This is conclusively proven, not only by Dr. Wescott's statement, "the selection of a solvent was a simple matter", and that the inhibition of corrosion by hydrochloric acid was well-known [R. 1913-14], but by the facts attending Pure Oil Co.'s initiation of the acidizing of wells, when Thomas (Pure Oil Co.) applied to plaintiff for hydrochloric acid. Grebe immediately, from his knowledge of corrosion inhibition, suggested the addition to the acid of a corrosion inhibitor [R. 2001]. The case is devoid of any proof that this involved anything more than Grebe's knowledge of the chemical action of inhibitors.

"Further, it is settled that articles may be new in a commercial sense, when they are not new in the sense of the patent law (*Collar Co. v. Van Deusen*, 23 Wall 530, 23 L. Ed. 128), and novelty, however great, can never be put in the place of invention (*Robins v. Link Belt Co.*, 233 Fed. 1005, 148 C.C.A. 15.) The fact that a patented device has had enormous sales does not dispense with all other evidence of invention." *Boston Pencil Pointer Co. v. Automatic Pencil Sharpener Co.*, 276 Fed. 910, 912, C.C.A. 2; *Cf. Reed v. Coe*, 132 F. 2d 509, 600, C.A.D.C.; *Grant v. Walter*, 148 U.S. 547, 554; Amdur's Patent Law and Practice, Sec. 74, p. 173.

BRIEF ON THE QUESTION OF INFRINGEMENT.

The issue of infringement is before this Court upon defendant's cross petition.

Even without Certiorari on defendant's cross-petition, the defense of non-infringement is before the Court for adjudication. *Langnes v. Green*, 282 U.S. 531, 535 *et seq.*; *Stelos Co. v. Hosiery Motor-Mend Corp.*, 295 U.S. 237, 239. Defendant does not challenge the findings of the District Court respecting how defendant protects its transportation tanks or the fact that in so doing the hydrochloric acid picks up minute amounts of chlorides which to some extent reduce the corrosiveness of the acid during its progress down the well. Defendant does, however, contend that this practice should not be held to constitute an infringement of the patent in suit.

Defendant first (in 1935) treated oil wells with hydrochloric acid and used steel tanks to transport the acid. Steel tanks are a practical necessity. Glass carboys cannot be economically used. Some means was necessarily employed to protect the tanks from corrosion. When defendant first operated, it used a corrosion reducing agent to protect its steel tanks; the agent principally used was Rodine or murodine [R. 256, 260] manufactured by the American Chemical Paint Co. [R. 980], the then owner of the Gravel patent 1,678,775 [R. 1947]. At that time the Grebe & Sanford patent had been adjudged invalid by the District Court in the Williams Bros. case. Upon the

reversal in January, 1936 of this judgment, defendant without incurring liability under the Tenth Circuit Court's decision, could no longer use the old Gravell method of protecting its tanks in transporting the acid to the wells. Therefore, defendant ceased acidizing wells [R. 262].

In June, 1936, defendant again started acidizing oil wells without, however, using Rodine or any other corrosion reducing substance in its acid. It used steel transportation tanks to haul its acid to the wells. To protect its steel transportation tanks against the corrosive action of the acid defendant invented and used an electrical system which involves the use of a lead plate as an electrode bonded to the interior of the steel tank, for which, on March 7, 1939, the Menaul patent 2,149,617 was granted [R. 263], (Physical Exhibit 191). It added no corrosion reducing substance to its acid. In its steel transportation tanks it attached the lead plates, described in the Menaul patent 2,149,617, to the inside of the tanks to provide an electrical arrangement to protect the steel of the tank against corrosion by the acid [R. 267]. In so handling the acid defendant used the usual steel tubing brass valves and fittings. There may have been some bronze in the pumps used [R. 386]. Like all steel, the steel of the tanks contained a small percentage of copper [R. 616, 390]. As the result of this handling and transportation, minute quantities of metal (iron, lead and copper) became dissolved as metal chlorides in the acid [R. 388-9].

Both the District Court and the Court of Appeals adjudged defendant's operations infringement. This determination was based upon plaintiff's assertion of the scope of the Grebe & Sanford claims extending to any inhibition of the corrosive action of the acid without regard to how such inhibition was secured or the amount of the inhibiting agent used. It is defendant's position that the Grebe & Sanford patent claims (if valid) are not entitled to such scope; that properly interpreted the patent explains the invention as consisting in the use of an agent which is added to the hydrochloric acid to prevent the dissolving action of the acid upon metals, and particularly upon steel or iron, copper, etc.; that the correct interpretation of the scope of the Grebe & Sanford patent is to restrict the claimed invention to the use of an inhibited acid which does not attack (dissolve) metal surfaces. Defendant employs ordinary commercial hydrochloric acid to which no inhibitor is added and which in attacking the steel tank and lead plate forms the inhibiting substances complained of by plaintiff.

The Grebe & Sanford patent specifies the addition to the hydrochloric acid of "a small amount of a substance capable of inhibiting attack of the acid upon metal surfaces, *e. g.*, of iron, or steel, copper, etc., with which it comes in contact." [R. 1501, ll. 75-78]. The purpose of adding such a substance to the acid is set forth in ll. 48-56. Nowhere in the patent is there even an intimation that the corrosive action of the acid may be prohibited or even lessened in any other manner than by adding such a substance *as will not attack (dissolve)*

metal surfaces. Therefore, according to the teaching of this patent, the substance added to the acid as an inhibitor must not attack (dissolve) metal surfaces and a reasonable interpretation of the patent's terms excludes any corrosion inhibition of the acid which is secured in any other manner than by adding such a substance as will not attack (dissolve) metal surfaces.

It is to be noted in this connection that the patent contains no reference whatsoever to either copper or iron or lead or the chlorides of either of these being utilizable as an inhibiting agent or substance (arsenic, etc. named in the patent) to reduce the corrosion (dissolving) of copper, iron or steel, etc.

Notwithstanding this, the adjudication of infringement is founded upon the "minute quantities of copper, iron and lead chlorides (which) are deposited on the inside of the steel container, forming a protective coating." [C.C.A. 6 Opinion, R. 2054.]

Metallic chlorides produced in the acid by dissolving metals are not the equivalent of the substances disclosed by the Grebe & Sanford patent to be added to the acid to prevent the attack of the acid upon metals, thereby producing the metallic chlorides. As said by this Court in *Goodyear Dental Vulcanite Co. v. Davis*, 102 U. S. 222 at 227: "This construction of the patent is confirmed by the avowed understanding of the patentee, expressed by him, or on his half, when his application for the original patent was pending. * * * But when a patent bears on its face a particular construction, inasmuch as the specification and claim are in the words of the patentee, it is reasonable to hold that such a construction may be confirmed by what the patentee said when he was making his application."

Plaintiff Disclaimed Metallic Chlorides as the Equivalent of the Specified Substances.

On August 8, 1932 [R. 2026], in its first action on the Grebe & Sanford application, the Patent Office rejected claims 1, 5, 7, 8 and 9 here in suit, because of the inevitable presence of chlorides in the acid, and made of record the patents to Muehl [R. 1546], Lake *et al.* [R. 1549], Tilton [R. 1553], Ranney *et al.* [R. 1565], and a patent to Coggeshall and two De Groot patents (not reproduced in record herein). On August 12, 1932 plaintiff's attorneys had an oral interview with the Patent Office Examiner [R. 2027] and filed a brief [R. 2027-38] discussing from plaintiff's standpoint the prior patents so made of record. This brief states [R. 2028]:— "The utility of hydrochloric acid treatment in increasing the flow of an oil well was first pointed out by Frasch in United States Patent 556,669 in 1896, but this method has never found general application due to the danger of corroding metal apparatus within the well. Present applicants have found and are first to find that any of a wide variety of inhibiting agents may be added to hydrochloric acid to prevent its attack upon metal surfaces within a well and that the so-treated acid may be employed to increase the flow of a well without danger of corroding metal surfaces within the same." In this brief metallic chlorides (the agents charged to infringe here) were specifically disclaimed as inhibitors:— "*Neither sodium chloride nor other metallic chloride may be employed successfully to inhibit the action of hydrochloric acid upon iron or steel and if they could be so employed they would, at the same time, inhibit the action of said acid upon the calcareous rock with which it is intended that it shall react. Metallic chlorides, then, cannot be employed in place of the inhibitors disclosed in the application, hence the fact*

that such chlorides are sometimes present within a well does not invalidate patentability of any claim in the application." [R. 2036, italics reproduced from brief, bold-face emphasis supplied]. This statement was supported by affidavit of Grebe [R. 2038-9] stating certain experiments made in order to compare the utility of various corrosion inhibitors disclosed in the Grebe & Sanford application, as agents to prevent attack of aqueous hydrochloric acid upon iron, with the utility of sodium chloride for similar purposes.

Thus plaintiff disclaimed all metallic chlorides as inhibiting agents or substances within the scope of the asserted invention sought to be patented and thus eliminated from the patent those chlorides (upon which the charge of infringement is based) which were thus excluded as equivalent inhibiting agents by this surrender of scope and definition of the claimed invention. *Wright v. Yuengling*, 155 U.S. 47; *Roemer v. Peddie*, 132 U.S. 313; *Greene v. Buckley*, 135 Fed. 520, C.C.A. 2; *Wilson & Willard Mfg. Co. v. Union Tool Co.*, 249 Fed. 729, 735, C. C.A. 9.

To hold the presence of metallic chlorides in defendant's acid constitutes an inhibiting substance in infringement of the patent is to extend the claims to cover that which was expressly disclaimed in the Patent Office. The law does not permit this. "It follows that what the patentee, by a strict construction of the claim, has disclaimed * * * cannot now be regained by recourse to the doctrine of equivalents * * *." *Exhibits Supply Co. v. Ace Patents Corp.*, 315 U.S. 126, 137. The Court of Appeals does not discuss, and apparently overlooked, plaintiff's disclaimer that metallic chlorides cannot be employed in the place of the inhibitors disclosed in the patent.

The Infinitesimal Amount of Copper Chloride Present in Defendant's Tank Acid Does Not Fall Within Any Range of Inhibiting Agent Required Under the Patent Disclosure.

Plaintiff was forced to concede at the trial that any commercial hydrochloric acid contains some of the very copper and lead chlorides the presence of which in defendant's acid is complained of [R. 373, 347]. These results from the contact of the acid during its manufacture with the pipes, pumps, etc. in which the acid is handled, just as they do during transportation to the wells from the contact in the steel tanks with the metal walls and lead plates.

At the trial plaintiff ~~conceded that the~~ Grebe & Sanford claims are not infringed if they are interpreted to include a small amount of inhibiting agent or to include the degree or amount of corrosion reduction resultant from the small amount of inhibiting agent normally present in commercial hydrochloric acid [R. 347, 373]. Immediately this suggests the question: How do the claims distinguish from such small amount of agent or such small degree of corrosion reduction? The method is the same, whether the agent occurs naturally, or incidental to the manufacture of the acid, or is formed thereafter, and irrespective of what amount of corrosive action is prohibited. The Grebe & Sanford patent claims do not disclose or define to what extent corrosion by the acid must be reduced in order to fall within the claimed invention and distinguish it from the degree of reduction of corrosion incident to the inhibiting agents forming a part of such commercial hydrochloric acid. In this respect the claims fail utterly to distinguish between the old and what is claimed to be the new. Also the claims call for the

presence in the acid of "a relatively small amount" of the corrosion-reducing agent. No standard of comparison is contained in the description of the patent, and no disclosure or definition of what is "a relatively small amount" is contained in the claims. The claims do not comply with the requirements of *R. S. 4888 (35 USCA, Sec. 33)*, which specifically requires that the applicant for a patent shall "particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery." The reasons for this statutory requirement have been restated by this Court as recently as May, 1938 in the case of *General Elec. Co. v. Wabash Appliance Corp.*, 304 US 364, 369. "But the vice of a functional claim exists not only when a claim is 'wholly' functional, if that is ever true, but also when the inventor is painstaking when he recites what has already been seen, *and then uses conveniently functional language at the exact point of novelty.*" [pp. 370-71]. Cf. *Germer Stove Co. v. Art Stove Co.*, 150 F. 141, 144, 145; *National Theatre Supply Co. v. Da-Lite Screen Co.*, 86 F. 2d 454, 455 (C.C.A. 7); *American Lava Co. v. Steward*, 155 F. 731, 736; *Farmers Cooperative Exchange v. Turnbore*, 111 F. 2d 728, 731-2 (C.C.A. 9).

The claims of the Grebe & Sanford patent are not limited in terms to an acid solution containing 1 to 5 per cent. of corrosion-reducing or inhibiting agents. They are wholly indefinite with respect to any proportions. They are therefore invalid. If they could be limited by the patent specification, then defendant would not infringe. Plaintiff has admitted that defendant's acid does not contain 1 to 5 per cent. of an inhibitor [R. 364, 366].

Compared with the corrosiveness of chemically pure hydrochloric acid, the corrosiveness of ordinary commercial hydrochloric acid is reduced by the inhibiting agent, present therein, resultant in its manufacture. The degree of such reduction or inhibition is not as great as the reduction or inhibition by the addition of an arsenic compound in an amount equal to one to five per cent. by weight of the acid solution. Plaintiff conceded at the trial that at no time did defendant's acid contain one to five per cent. of anything which plaintiff claimed to be an inhibitor [R. 364]. Plaintiff conceded that defendant's acid did not contain as much as $1/25$ th of one per cent. of inhibiting substances [R. 364; *Cf.* Bartell - 366]. Plaintiff's witness Bartell testifies that some commercial hydrochloric acid contains substances or "impurities" inhibiting or reducing its corrosiveness 15 to 18 per cent. [R. 352-3, 441, 469-70]. Such a 15-per-cent. inhibited commercial acid is 85 per cent. as active as chemically pure hydrochloric acid. The solution referred to in the patent description [p. 2, ll. 72-4 - R. 1502] is reported by Bartell to give "a reduction in corrosiveness of 97 per cent." This is "a corrosiveness of 3 per cent. (of) that of the C.P. (chemically pure) acid." [441.]* "So, on that basis the acid [Detroit Chemical Works commercial acid - *Cf.* R. 352-3] showing 85 per cent. corrosion would be about 28 times as active as one showing 3 per cent. corrosion." [Pat. p. 2, ll. 92-4 - *supra*; R. 441]. According to Bartell's testimony [R. 439] defendant's acid is 17 times as active as the inhibited acid of the patent in suit. The Grebe & Sanford patent uses the terms,

*Plaintiff's publication, "The Acidizer," April, 1939, states that plaintiff's Dowell inhibitor gives 99 per cent. reduction in corrosiveness. [R. 442.]

"largely or substantially inhibited" [R. 1502, l. 15], "no *substantial* attack upon the pump tube," [*Id.* 25-6], and "without *appreciable* damage to the pump tube or well casing" [*Id.* 96-7]. Bartell admits [R. 467-79] that there is nothing in the patent to indicate whether or not one acid is largely or substantially inhibited with respect to another or to give any definiteness of meaning to these terms "largely", "substantially", "appreciably", used in the patent; that the term "substantially", so used, might correctly be applied to the reduction in corrosiveness existent in commercial acid as compared with chemically pure acid, as well as to defendant's acid, or to the one to five per cent. of an arsenic compound acid of the patent [R. 467-70]; that the patent does not give any quantitative figure or quantitative value for the amount of the inhibitor that may be allowed within commercial hydrochloric acid, if commercial acid could be assumed as intended to be referred to in the patent [473].

According to Bartell's testimony [R. 381, 437, 377, 429-30], defendant's acid contains:— *Copper*: Stella Wilcox sample No. 6—3.6 parts per million, or 0.00036% [437]; Zahn—0.00031% [437]; Crawford—0.00048% [437]. *Iron*: Stella Wilcox No. 6—0.0473% [437]; Zahn—0.0380% [437]; Crawford—0.0210% [437]. *Lead*: Stella Wilcox No. 6—0.04017% [437]; Zahn—0.0435% [437]; Crawford—0.0053%. [*Cf.* PX 160, R. 1711.] Iron reduces corrosion little or none [R. 379, 505]. "The iron doesn't seem to make much difference." R. 404.] *Cf.* 398-9, 401, 403. Bartell [R. 392] says:—"As we have shown, the ferrous iron has apparently no inhibiting action; if it happens to be in the ferric form it might have a slight inhibiting action." The charge of infringement is based essentially on the copper chloride

found in defendant's acid [R. 378-80, 389, 390, 406, 505, 525, 614]. Some of the copper presumably came from the bronze and brass fittings and pump. It may have come from most anywhere [R. 382-3, 386]. The copper chloride got into the acid only as the result of the normal handling of the acid with defendant's equipment [R. 387-9]. Most of the copper probably came from the steel of the tank used to haul the acid to the well [R. 387-90, 661, 665, 669, 670, 674, 675]. All steel contains some copper [R. 616]; tank steel perhaps more than any other steel [R. 661, 674, 675]. Defendant bought one of the purest commercial acids on the market [R. 380]; it contained some copper chloride [about one-fourth the total amount found in the acid at the wells - R. 1713] and other impurities, which reduced its corrosiveness. All commercial acids are known to contain some inhibitors [R. 367, 398], even including arsenic compounds [R. 1081, 1082]. Plaintiff's expert Dr. Prutton testified [R. 525]:—"As has been reported by myself and Dr. Bartell, the copper is the vital element in the inhibition." [Cf. R. 614.] "*Yes, the copper is the effective agent, there is no question about that.*" [Plaintiff's counsel, Mr. Owen - R. 406]. Bartell concludes that the corrosiveness of defendant's acid is reduced to 53% of the corrosiveness of chemically pure hydrochloric acid,—47% reduction in corrosiveness [Cf. R. 338-39]. Bartell testified that defendant's acid is 53 times as active as plaintiff's according to the representations in plaintiff's advertising that its acid is 99% inhibited [R. 442].

3.6 parts per million is an infinitesimal amount of copper. It is 36/1000ths of 1/100th of 1% of the whole solution,—not one to five per cent. by weight of the hydrochloric acid solution as comprehended by the patent

[R. 1502, *II*. 73-4]. Bartell testifies this infinitesimal amount of copper reduces the corrosiveness of the hydrochloric acid solution 33 per cent. [R. 407, 429-30]. Available commercial hydrochloric acid has its corrosiveness reduced 15% to 18% (Detroit Chemical Co's commercial acid). [R. 353-5]. The claim of the patent does not refer to *reduction* in corrosiveness [R. 369]. Plaintiff's position before the Trial Court was that the patent claimed only the effect, and was not limited to any degree of reduction of corrosiveness [R. 366-7].

Defendant's tank acid has its corrosiveness reduced 42 per cent [R. 338]. There is no definition in the Grebe & Sanford patent of the degree of reduction of corrosiveness which is required to bring the operation within the purported invention [*Cf.* R. 355-95, 361; F.F. 87, R. 1491].

Some of these minute amounts of copper, lead and iron chlorides found in defendant's transportation tanks were "incidental to the operation of defendant's method of protecting its transportation tanks." [F.F. 90—*Id.*] But plaintiff seeks to enjoin defendant from hauling acid to the wells in steel tanks, whether lead plates are used to protect the tanks or not [R. 389-90].

According to Bartell's testimony, the iron, lead and copper that he found in defendant's tank acid was produced by the action of the hydrochloric acid upon the tanks and equipment. Such action was a dissolution of these metals into chlorides,—iron chloride, lead chloride and copper chloride. The proven fact is that the hydrochloric acid attacks the metals and produces these chlorides, *instead* of there being in defendant's acid any "substance capable of inhibiting attack of the acid upon metal surfaces, *e. g.* of iron or steel, copper, etc., with which it comes in contact,"—the stated object of the alleged new method.

If the claims can be sustained as particularly pointing out and distinctly claiming the invention (*R.S. 4888-35 U.S.C.A., Sec. 33*) this can be done only by restriction of the claims to an amount of agent substantially equal to the "1 to 5 per cent of the arsenic compound" or of the other agents catalogued in the patent. To adjudge thirty-six one-thousandths of one one-hundredth of 1 per cent of inhibiting agent the "equivalent" of "1 to 5 per cent" is to eliminate any substantial distinction between a Grebe and Sanford inhibited acid and commercial acid. To sustain plaintiff's interpretation of the scope of the patent claims, is to establish in plaintiff a monopoly of inhibiting the corrosive action of the hydrochloric acid upon the metal equipment of the well regardless of how such inhibition is secured or to what degree the corrosion is reduced.

Conclusion.

It is respectfully submitted that the decree dismissing the suit should be affirmed both upon the ground that the Grebe & Sanford patent is invalid and upon the ground that the use of metallic chlorides (of iron, copper and lead) are not in law equivalents of the inhibiting substances disclosed and claimed in the Grebe & Sanford patent.

Respectfully submitted,

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SUPREME COURT OF THE UNITED STATES.

Nos. 50 and 61.—OCTOBER TERM, 1944.

The Dow Chemical Company,
Petitioner,

50

vs.

Halliburton Oil Well Cementing
Company.

Halliburton Oil Well Cementing
Company, Petitioner,

61

vs.

The Dow Chemical Company.

On Writs of Certiorari to
the United States Circuit
Court of Appeals for the
Sixth Circuit.

[March 5, 1945.]

Mr. Justice MURPHY delivered the opinion of the Court.

In issue here is the validity of United States Patent No. 1,877,504, relating to "the treatment of deep wells, such as oil, gas, brine or water wells, to increase the output therefrom," issued to John J. Grebe and Ross T. Sanford on September 12, 1932.

Petitioner, the owner of the patent, brought this suit against respondent for alleged infringement. Both the District Court for the Eastern District of Michigan and the Sixth Circuit Court of Appeals held the patent invalid for want of invention and denied relief. 139 F. 2d 473. Previously the Tenth Circuit Court of Appeals, in reversing the judgment of the District Court for the Northern District of Oklahoma, had held the patent valid and infringed in a suit brought by petitioner against another party. *Dow Chemical Co. v. Williams Bros. Well Treating Corp.*, 81 F. 2d 495, cert. denied, 298 U. S. 690. The conflicting views of the appellate courts concerning the validity of the same patent led us to grant certiorari in this case, 322 U. S. 719, and oblige us to decide independently the factual issue of validity. *Universal Oil Co. v. Globe Co.*, 322 U. S. 471, 473.

The stated object of the Grebe-Sanford patent is "to counteract some preventable natural causes for the decline of yield of a well" where the well has been drilled into a limestone or other calcareous formation. As oil is pumped from a well, the under-

ground flow to the well decreases and the yield declines until pumping is no longer profitable. Yet it is known that when that point is reached there often remains embedded in the rock formation a great deal of oil unrecoverable by ordinary processes. Many methods have been suggested to recover this hidden oil. The forcing of water or gas into the rock formation, the heating of the surrounding rock and the use of explosives have all been proposed but found wanting in one way or another.

Eventually, however, the idea was conceived of using acid to dissolve the limestone, thus opening channels through which the oil could flow into the well. This idea first appears to have been developed in United States Patent No. 556,669, issued on March 17, 1896, to Herman Frasch, with a half interest being assigned to John W. Van Dyke. The essence of this patent was the introduction into the oil well of a large solution of hydrochloric acid under pressure, with fresh water being added later to force the acid further into the limestone. Frasch recommended the use of commercial hydrochloric acid containing from 30% to 40% by weight of the acid gas HCl ; he further recommended that the acid remain in the well for twelve hours. A suitably arranged packer was to be used to confine the acid to the lower or oil-yielding portion of the well hole.

Frasch also recognized that the hydrochloric acid was likely to corrode the metal well equipment. Hence the patent suggested that the regular well tubing be removed and that an enameled or lead-lined pipe be inserted to conduct the acid down into the well, "or it may be otherwise made proof against corrosion." An additional suggestion was that an alkaline liquid be introduced to neutralize the acid after it had performed its function.

Frasch's method proved successful in disintegrating limestone rock and increasing the flow of oil. The record shows that at least fourteen commercial wells near Lima, Ohio, were treated with this process in 1895 and 1896, resulting in substantial production increases in most instances. Wide publicity was given to these operations. But despite this success, Frasch and Van Dyke soon discontinued their work along these lines. The reasons for this abandonment are not clearly disclosed by the record. Respondent suggests personal reasons on the part of Frasch and Van Dyke and claims that the relatively undeveloped oil industry at that time had little use for such an invention. Petitioner, how-

ever, contends that Frasch's method was so cumbersome and expensive that it was commercially impracticable;¹ such is also the reason advanced by the court in the *Williams Bros.* case, 81 F. 2d at 496.

Whatever the reason for the failure of the Frasch method to achieve wide-spread use, the Grebe-Sanford patent in issue claims to be an improved method of treating wells with a hydrochloric acid solution. The patent expressly recognizes the Frasch treatment but states that it was never generally adopted "due to the fact that the acid attacks the metallic casing, pump tube, etc. about as actively as the rock, and causes serious damage thereto." To meet this alleged defect, the Grebe-Sanford patent proposes the use of a hydrochloric acid solution containing "a small amount of a substance capable of inhibiting attack of the acid upon metal surfaces . . . with which it comes in contact." The preferred inhibiting agent is one of several specified arsenic compounds, to be added in the amount of from 1% to 5% of the weight of the solution. Numerous other inhibitors are also suggested. The patent further states that "the strength of the aqueous hydrochloric acid solution, in general best adapted to the purpose in hand, may be between about 5 per cent and about 20 per cent, and preferably should be between 10 and 15 per cent although other concentrations may be used, if desired." Claim 8 (claims 1, 5, 7, 8 and 9 are in issue) best sums up the preferred form of the Grebe-Sanford process:

"The method for increasing the output of an oil well which comprises charging into the pump tube a quantity of a 5 to 20 per cent hydrochloric acid solution containing a relatively small amount of a corrosion inhibitor, expelling the acid from the tube into the bore of the well by applying pressure thereon, permitting the acid to act upon the rock formation surrounding the well cavity and withdrawing the spent acid."

The parties differ as to the precise scope of the alleged patentable improvement over the Frasch method of acidizing wells. Respondent urges, and the two courts below held, that the sole object

¹ Petitioner argues that (1) Frasch used concentrated acid that was so corrosive as to compel the use of the costly and cumbersome expedient of removing the ordinary well tube and inserting a special acid supply pipe; (2) concentrated acid being less effective than diluted acid in reacting on the limestone rock, the production increases achieved by Frasch were too small to justify the expense of the treatment; and (3) viscous spent acid was difficult to remove under the Frasch method from the pores of the rock and hence blocked or lessened the flow of oil to the well hole.

of the Grebe-Sanford process is simply to protect the well equipment from corrosion by adding an inhibiting agent to the hydrochloric acid solution.² Petitioner has consistently claimed, on the other hand, that the patent specifies three novel points which elevate the described process to the level of an invention: (1) the addition of an inhibiting agent to the hydrochloric acid solution to prevent corrosion; (2) the use of a dilute rather than a concentrated hydrochloric acid solution; and (3) the use of the ordinary pump tube instead of a specially protected supply pipe to introduce the acid into the well. Assuming without deciding that petitioner's version of the alleged improvement is correct, however, we hold that no one of these three claims and no combination thereof evidences that degree of skill and ingenuity which constitutes the essential ingredient of a true invention.

(1) *The addition of an inhibiting agent.* It is clear that the Grebe-Sanford suggestion that an inhibiting agent, preferably an arsenic compound, be added to the hydrochloric acid solution presents no patentable advance over the prior art. Petitioner makes no claim that the inhibiting agent in any way affects the chemical action of the acid on the limestone rock; it states merely that the inhibitor acts so as to prevent or restrict the corrosive effect of the acid on the metal well tubing and equipment. But long before the Grebe-Sanford process was patented it had been known that inhibiting agents could be used to protect metals from acid solutions. More particularly, it was well known that arsenic compounds mixed with hydrochloric acid solutions acted as effective inhibitors and numerous patents embodying that principle had been granted.³ Various inhibitors were available on the market at the time of the conception of the Grebe-Sanford process and

² One of petitioner's experts testified that the main claim of the Grebe-Sanford patent is the addition to the hydrochloric acid of some material which will inhibit the action of the acid and that the claimed result "would be limited apparently to the equipment, rather than to the well itself." He stated further that the suggested inhibitors "would have no effect on the acid in connection with its reaction upon limestone" and that they "have a specific function on the metal equipment used in connection with the well treatment."

³ See, for example, Patent to Beneker, No. 914,916 (1909); Patent to Gravell, No. 1,678,775 (1928). For patents involving the use of inhibitors other than arsenic compounds, see Patent to Holmes, No. 1,470,225 (1923); Patent to Rhodes, No. 1,746,677 (1930); Patent to Rhodes, No. 1,746,678 (1930); Patent to Vignos, No. 1,750,651 (1930); Patent to Harrison, No. 1,766,902 (1930); Patent to Corson, No. 1,773,953 (1930); Patent to Calcott, No. 1,785,513 (1930); Patent to Burke, No. 1,789,805 (1931).

were used extensively in the commercial pickling of iron and steel products in acid solutions and in the transportation of acids in metal containers.

There was evidence, moreover, that in 1928 and 1929 the Gypsy Oil Company had successfully used inhibited hydrochloric acid to remove scale from certain of its oil wells drilled in sandstone formations. This process was based upon a report made on behalf of the Mellon Institute at Pittsburgh at the request of the Gypsy Oil Company, which had been bothered by the formation of scale on the metal well equipment. The report, after noting that "the selection of a solvent was a simple matter" and that "the commercial use of inhibitors for the protection of metals in acid solutions is not new," recommended the removal of the scale by the use of a hydrochloric acid solution treated with an inhibitor obtainable on the market. Even if petitioner be correct in labeling this Gypsy Oil Company use as an abandoned experiment not amounting to anticipation, it is significant that the use of an inhibitor to check the hydrochloric acid from corroding the metal well equipment while attacking the scale suggested itself without trouble.

Thus prior to the patenting of the Grebe-Sanford process in 1932 the following facts were manifest and elementary to any one skilled in the art: (a) hydrochloric acid would dissolve limestone and increase the production of oil wells, as demonstrated by the Frasch patent; (b) hydrochloric acid would also corrode metal with which it came in contact; (c) arsenic compounds and other chemicals could be added to hydrochloric acid to inhibit this corrosive effect; and (d) inhibited hydrochloric acid could effectively be utilized to remove scale from metal well equipment without corroding the metal. A representative of the Pure Oil Company then suggested to Grebe and Sanford the possibility of acidizing oil wells to increase production. The latter, from their knowledge of brine well acidizing and of corrosion inhibition, immediately recommended the use of hydrochloric acid containing an inhibitor. Grebe and Sanford at this time apparently did not know about the Frasch patent. But spurred by the suggestion of the Pure Oil Company, they worked out the process in issue on the basis of known facts and reactions.

All the Grebe-Sanford process taught was the obvious fact that hydrochloric acid could be inhibited to prevent corrosion while

6 *Dow Chemical Co. vs. Halliburton Oil Well Cementing Co.*

being used to dissolve limestone rock pursuant to the Frasch method of acidizing wells. No new mental or physical operation was required to add, as suggested by the Grebe-Sanford process, an arsenic compound of from 1% to 5% of the weight of a hydrochloric acid solution. No new or unexpected results were obtained by the addition of such an inhibitor. It was perfectly plain to an expert that the metal well equipment would thereby be protected from corrosion. The Grebe-Sanford method, in short, involved in this respect no more than a mere application of an old process of inhibition to a new and analogous use of protecting metal well equipment from corrosion when the well is being acidized to increase production. Such a process lacks the very essence of an invention. See *Electric Cable Co. v. Brooklyn Edison Co.*, 292 U. S. 69, 79, 80; *Paramount Publix Corp. v. American Tri-Ergon Corp.*, 294 U. S. 464, 473; *Cuno Engineering Corp. v. Automatic Devices Corp.*, 314 U. S. 84, 89.

The fact that prior to 1932 no one had apparently thought to use an inhibitor while acidizing an oil well to increase production cannot inject into the Grebe-Sanford process the attributes of an invention. Especially is this so since there is no evidence of any one trying unsuccessfully to inhibit hydrochloric acid for such purposes. He who is merely the first to utilize the existing fund of public knowledge for new and obvious purposes must be satisfied with whatever fame, personal satisfaction or commercial success he may be able to achieve. Patent monopolies, with all their significant economic and social consequences, are not reserved for those who contribute so insubstantially to that fund of public knowledge.

(2) *The use of a dilute rather than a concentrated hydrochloric acid solution.* Petitioner lays great stress on the fact that the Grebe-Sanford process suggests the use of a dilute hydrochloric acid solution containing only 5% to 20% HCl (preferably 10% to 15%). It is pointed out that Frasch's patent called for the use of commercial hydrochloric acid, which contains from 30% to 40% of HCl and that in some of his treatments from 27% to 28% was actually used. Petitioner claims that the dilution recommended by the Grebe-Sanford process substantially reduces the viscosity of the acid, greatly slows its reaction on limestone (thus allowing the acid to open up channels distant from the well hole instead of spending itself immediately and entirely

on the nearby rock) and greatly reduces its corrosive action on iron and steel.⁴

Nothing appears in the Grebe-Sanford patent claims, however, to support the thesis that dilution is part of the alleged invention. The main concern seems to have been directed at the failure of Frasch to recommend the use of an inhibiting agent. The suggested strength of the Grebe-Sanford solution is merely the one "in general best adapted to the purpose in hand" and it is said that "other concentrations may be used, if desired." Apparently dilution is recommended since the inhibiting agent can act more effectively with a weaker acid, which is obviously less corrosive than a more concentrated acid. At the same time, the recommended dilution allows the solution to be of a strength such that the soluble salts formed by its action on the rock will remain dissolved therein. The patent does not state that an acid outside the range of 5% to 20% strength will fail and no affirmative advantage over the Frasch method is claimed insofar as the strength of the acid is concerned.

But even assuming that a dilute solution is an ingredient of the alleged invention, we can find none of the elements of true invention adhering thereto. The mere addition of water to dilute a known chemical solution does not entitle one to a patent monopoly, at least unless a definite dilution point or range is discovered corresponding to a physical phenomenon. *Kwik Set, Inc. v. Welch Grape Juice Co.*, 86 F. 2d 945, 947. No such discovery was made here. The advantages said to accompany a dilute solution do not correspond to any particular dilution point or range. The patent recommends that the acid be diluted to a 5% to 20% strength but it is recognized that "other concentrations may be used, if desired," to achieve the purpose at hand. Such a broad and indefinite specification as to dilution is fatal to a claimed invention.

(3) *The use of the ordinary pump tube.* The Grebe-Sanford patent mentions the use of the ordinary pump tube to convey the acid to the bottom of the well hole, whereas the Frasch patent had contemplated withdrawal of the ordinary pump tube in favor of a smaller and specially protected supply tube. But this is at most an incidental and unimportant part of the Grebe-Sanford

⁴ There was evidence introduced to the effect that a hydrochloric acid solution is much more corrosive when it contains 30% HCl than when it contains from 5% to 20%.

method, as is recognized by the statement in the patent that "it is not necessary, however, to add the acid solution through the pump tube, as any other convenient way may be employed." No new function is performed by the pump tube that is not performed by the Frasch supply tube; both merely convey the acid to the bottom of the well hole. Any advantage in cost or simplicity which the use of the ordinary pump tube may give is the result of the use of an inhibitor in the acid rather than any intrinsic merit of the pump tube. It is elemental that the mere substitution of equivalents which do substantially the same thing in the same way, even though better results may be produced, is not such an invention as will sustain a patent. *Dunbar v. Myers*, 94 U. S. 187, 199; *Smith v. Nichols*, 21 Wall. 112, 119.

Finally, petitioner claims that the Grebe-Sanford process has filled a long felt want and has been a commercial success. But these considerations are relevant only in a close case where all other proof leaves the question of invention in doubt. *Smith v. Hall*, 301 U. S. 216, 233; *McClain v. Ortmyer*, 141 U. S. 419, 428, 429. Here the lack of invention is beyond doubt and cannot be outweighed by such factors. Moreover, there is an absence in this case of any long felt want or of any recognized problem that had baffled the contemporary art. There is no evidence that any one with knowledge of the Frasch method and with knowledge of the use of inhibitors in hydrochloric acid ever tried unsuccessfully to use the Frasch method with inhibited hydrochloric acid. Nor is there any proof of fruitless demands and efforts to prevent corrosion while acidizing oil wells. Whenever the need arose to prevent corrosion in the use of hydrochloric acid, whether for purposes of pickling, scale removal or oil well acidizing, the addition of inhibitors was suggested immediately and without effort. The great fund of public knowledge was simply drawn upon the first time the problem was considered, resulting in the obvious process described in the Grebe-Sanford patent.

Since we conclude that the Grebe-Sanford patent is invalid for want of invention, we need not consider respondent's cross-petition raising questions as to whether respondent's process infringed the patent.

Affirmed.